VOL. XI, NO. I. 20TH JULY, 1915.

New Zealand Department of Agriculture,
Industries, and Commerce.

THE

JOURNAL

OF

AGRICULTURE.

Published by direction of
The Right Hon. W. F. MASSEY, P.C.,
Minister of Agriculture, Industries,
and Commerce.

WELLINGTON.
BY AUTHORITY: JOHN MACKAY, GOVERNMENT PRINTER.

1915.

Romneys at Weraroa.

The

Journal of Agriculture.

WELLINGTON, NEW ZEALAND.

20TH JULY, 1915.

THE GROWING AND UTILIZATION OF FORAGE CROPS.*

A. McTAGGART, M.S.A.

PHYSICAL CONDITION OF THE SOIL.

IN the effective growing of forage or any crops the soil is of first consideration. The physical condition of the soil should first be attended to, and under this head drainage takes precedence of any other form of soil-treatment. Without effective drainage it is practically a waste of money and time to apply lime and fertilizers. In the draining of land the first consideration is whether or not there is sufficient outlet for the drainage-waters. Then the fall or grade should be determined. Land with a fall of 2 in. in 100 ft. can be drained provided there is adequate outlet. The main drain should follow the lowest part of the field or farm, and laterals should be conducted into this at various points on the herring-bone principle, each lateral entering the main at a point not

*Address delivered by Mr. McTaggart (Agriculturist to the Department) at the National Dairy Show, Palmerston North, June, 1915.

exactly opposite the opposing lateral. To thoroughly drain land the laterals should be placed 70 ft. apart on average soils, and from 25 ft. to 40 ft. apart on stiff clays. Where tiles or pipes are employed to effect this perfect drainage the main should consist of a pipe ranging from 6 in. to 12 in., according to the grade. The shallower the grade the larger the tile. Laterals should consist of either 3 in. or 4 in. tiles. Where sublaterals are employed a 3 in. pipe should enter a 4 in. lateral. For satisfactory draw the tile should be placed in a ditch on the average 3 ft. deep. The next best to pipes is manuka, cut when of good vigorous growth and when the sap is down. Another good means of effecting good drainage, and one that is specially suited to pasture land with stiffish clay subsoil, is the use of the drain or mole plough. It is a system that has given splendid results in Southland. The plough consists of a long plate, at the foot of which is a mole, which, when drawn through the soil at a regulated depth, leaves a channel along which the water flows.

After drainage the next factor to attend to in order that a soil may grow forage crops to the best of its ability is that of liming. The effects of liming land are as follows: It neutralizes soil-acidity, with which most New Zealand soils are well supplied, and the ridding of the land of acidity greatly promotes the activity of the soil-bacteria upon which plants are so dependent for their supply of available or soluble plant-food. It supplies a base for the formation by bacteria of nitrates, in which form alone a plant can take up its food from the soil. It liberates potash, and thereby greatly increases the growth of plants, clovers particularly. It also renders available to some extent phosphates. It prevents the loss of free phosphoric acid by converting it into the form of slowly soluble phosphate. It warms the soil, and so promotes early and greater growth. In a dry season lime previously supplied to land will cause the conservation of moisture to some extent. It also has the effect of greatly minimizing attack by fungus diseases lurking in the soil. These are the chief effects of lime. As to the form in which lime should be applied, this depends upon the nature of the soil. On a light soil lacking somewhat in humus the only form of lime that should be used is the carbonate—finely ground limestone. This form does not attack the humus as does burnt lime, is gentler in its action, and exerts its effects over a longer period. On a soil well supplied with humus, as indicated usually by good dark colour to a fair depth from the ground-surface, the burnt lime can with safety be used. Where it is imperative that the burnt lime should be used on light land, owing, for instance, to the lesser haulage, only small or compara-

tively small quantities should be used, and it is more desirable to use thereon small quantities frequently rather than large at infrequent times. On the average at least ½ ton of burnt lime, or its approximate equivalent 1 ton of finely ground limestone, per acre should be used on soils requiring lime. Of course, larger quantities will be required in many instances, but for reasonable and usually non-expensive application these quantities are serviceable dressings. The best way to apply lime is to make use of a reliable distributor, of which machines there are several on the market. These are usually constructed so as to regulate the quantity of lime required to be applied. Lime is of considerable importance for production from New Zealand soils as a whole, these, as already stated, being well supplied with acidity due to the climate and the centuries of decaying vegetable matter associated with them.

The next step in the physical treatment of soils for the effective growing of forage crops is attention to the humus-content. When soils are lacking in humus, provision should be made for supplying this substance. Its incorporation with a soil requiring it will, like lime, cause greater use to be made by plants of the fertilizers subsequently applied. The most feasible means in this country of supplying humus to a soil is to make use of green-manuring. Quick-growing catch-crops grown on stubble land and ploughed under are the most economical forms of green-manure supply. White mustard grows in autumn in from six to eight weeks, sufficient to provide abundant growth for ploughing under. It can be readily seeded by merely disking the stubble, scattering the seed broadcast, and harrowing in. The systematic use of green-manuring crops, legumes (pod-bearing plants) especially, on soils requiring humus will obviate the necessity for expensive nitrogenous fertilizers.

Next in importance in the physical treatment of the soil is cultivation. Thorough cultivation is required to promote a fine seed-bed, an important factor in crop-production. In general, the rule should be followed—the finer the seed the finer the seed-bed. Thorough and timely cultivation is also necessary to kill weeds, to promote nitrification, to conserve moisture, to enlarge the root-system—hence feeding-power of the plant—and to give foothold to the crop. Drilled crops should be given subsequent cultivation, and this factor, if properly attended to, will, as a rule, amply repay the cultivator.

FERTILIZERS AND CROPS.

Having attended to the physical condition of the soil, the grower of forage or other crops is in a position to effectively

treat the soil from the chemical standpoint, provided he understands his soil and the feeding-habit of the crop he is growing. There are ten essential plant-food constituents, and of these there are three that are important. They are required in greater quantity than are the other constituents, for the reason that they are more readily depleted from the soil. These substances are nitrogen, phosphoric acid, and potash. An understanding of the functions performed by these three substances will enable one the more intelligently to use manures for different kinds of forage crops calling for these substances in various forms. Nitrogen promotes the abundant growth of stem and leaf, hence crops grown for this purpose, such as kale, cabbage, rape, &c., require manures in which nitrogen is the dominant constituent. On the other hand, abundant nitrogen in a manure causes too vigorous growth, and hence renders the crop less fortified to resist attack by fungus diseases. This condition is offset by a due proportion of phosphoric acid and potash in the manure. Phosphoric acid plays a very important part in the promotion of root-development, and this is the reason why this substance is the dominant constituent in the manure for a shallow-rooted crop like turnips. A seed, which is a plant in miniature, contains abundance of phosphorus, and it is this vital substance that in the presence of suitable temperature and moisture causes the young seed to sprout and to rapidly push its roots down into the soil ere adverse conditions strike the crop. Phosphoric acid also plays an important part in the formation of protein (flesh-former), in which substance clovers are specially rich. Potash plays an important part in the formation of carbohydrates (sugars and starches), and crops like mangels that are rich in these substances should be supplied with potash in fair quantity. Potash also gives quality and flavour to fruit, and strengthens the straw in cereals. Supplied in fair quantity to a crop, it fortifies it against attack by fungus diseases.

To deal more directly with the application of fertilizers: Operating in the soil in connection with plant-growth is the Law of the Minimum. There may be in the soil sufficient phosphoric acid and potash, and the nitrogen may be lacking. Increase the first two as you will, but add no nitrogen, there will be no marked response in the growth of non-leguminous (non-pod-bearing) crops. The nitrogen in this case is the limiting factor. As soon as nitrogen is supplied there is a marked response. So also conditions may obtain in which potash may become the limiting factor, as often occurs in a sandy or gravelly soil. In like manner phosphoric acid may assume the role of the limiting factor, as frequently occurs in certain drained swamp soils. Just as the chain

is as strong as its weakest link, so the maximum growth of any crop is dependent upon the quantity of nitrogen, phosphoric acid, or potash that in least quantity is available for its use.

The principal factors governing the use of fertilizers are as follows: The nature of the soil—a soil may be deficient in one or more important constituents, or may be open and non-rententive. Basic slag supplied a second time to certain light, open soils frequently fails to give results, the reason being that the small quantity of potash they contained in the first place has been used up. The climate is also an important factor. In a dry season or climate a readily soluble phosphate is required for crops demanding phosphates. In a damper season or climate less soluble phosphate could be used—phosphate that in a dry climate would be very slowly soluble. The period of growth has also to be considered. Soft white-fleshed turnips, which have a shorter growing-period than yellow-fleshed or swedes, require a more soluble phosphate and slightly more of this manure than yellow-fleshed turnips. The habit of growth is an important factor—whether a crop is naturally shallow-rooted or not, and what is its feeding-habit—for one class of crops requires more of one soil-constituent than does another class.

Where similar manures are applied a second year to similar crops grown on the same land, allowance should be made for the residual effect of these fertilizers. Where phosphates are used the second application should be cut down by one-third, and where potash manures are applied the succeeding application should be diminished by one-half.

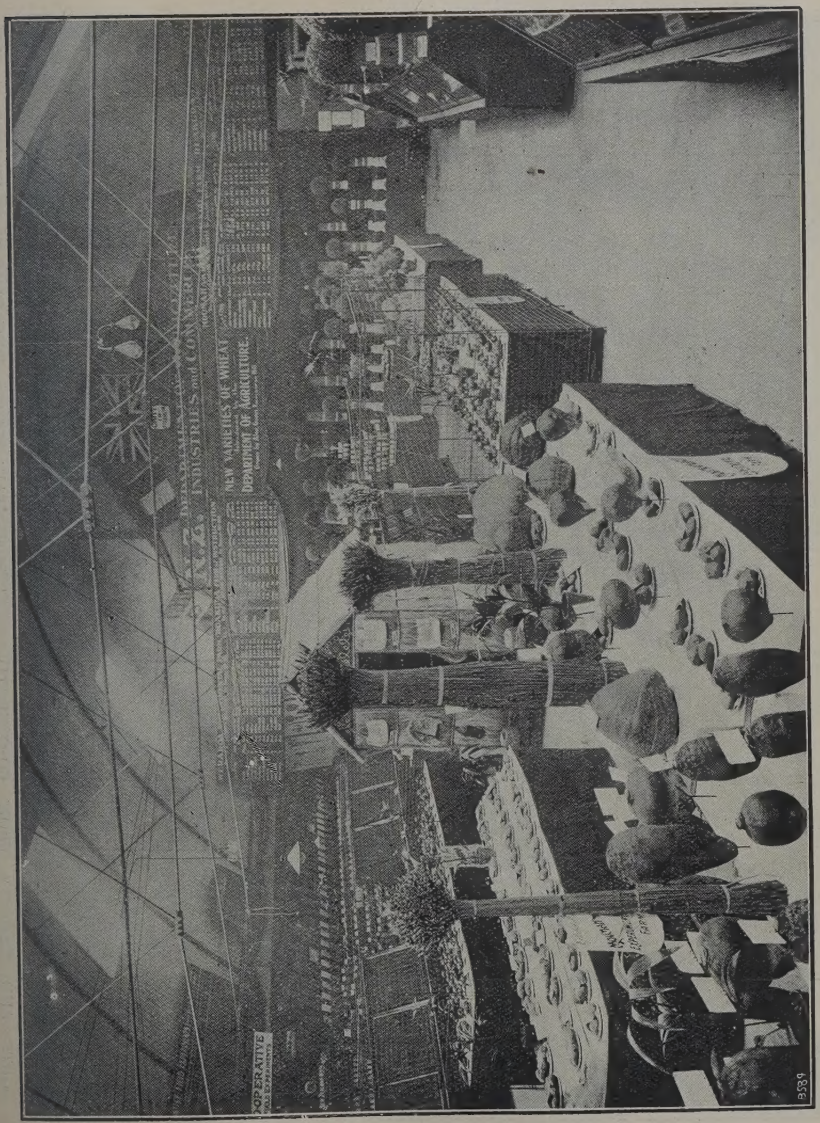
Treating more specifically of the manuring of various forage crops, and at the same time referring to certain factors in their successful cultivation and utilization:—

Mangels require deeper and warmer soils than turnips or swedes. They are naturally deeper-rooted, and hence can the better search for their food. Thus phosphoric acid is not so important in the manure for mangels as it is for turnips or swedes. Nevertheless, a liberal use of superphosphate in the growing of a crop of mangels in a dry climate or season will, it is said, often mean the difference between a poor crop and a satisfactory one. Long Red mangels require deeper soils than do the other types, are larger yielders, but are less nutritious. Intermediate, Tankard, and Globe types are more suited to shallow soils than the long red. The Globe is the lowest yielder, but is the richest of the four. Mangels, containing as they do abundance of sugars, require potash in goodly quantity. A phosphate is required to develop root to some extent. A readily available nitrogenous manure is required to a lesser

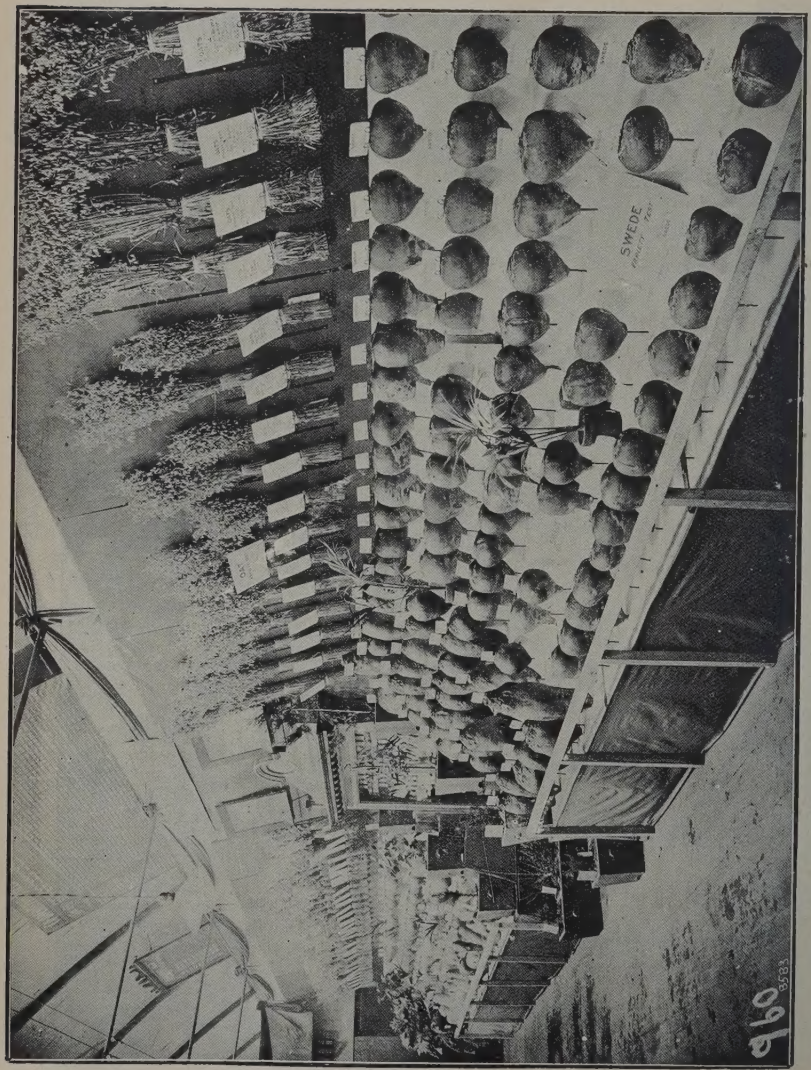
extent, on account of early growth being important with mangels. The natural habitat of the mangel being near the sea, it is a good practice to supply from 1 cwt. to 2 cwt. of salt per acre with the manure. Under average soil-conditions the following mixture of manures per acre would be considered good manuring for mangels: 2 cwt. superphosphate, 1 cwt. Christmas Island guano, 1 cwt. sulphate of potash, ½ cwt. sulphate of ammonia, or 1 cwt. blood-and-bone manure. The drilling and fairly frequent cultivation of mangels is important for a full crop.

Swedes.—Swedes require slightly richer soils than do turnips. They are somewhat shallow-rooted, hence require as the dominant constituent of the manure a phosphate suited to the soil. Nitrogen is required to a lesser extent. For clays, basic slag, applied at least two months before seeding, and a little blood and bone at seeding, would be a suitable form of manuring. For clay loams, basic slag or basic superphosphate and a little blood and bone; for average loams containing sufficient lime, superphosphate and a small quantity of blood and bone; for light loams, basic superphosphate, or equal quantities of superphosphate and bonedust or of superphosphate and guano, together with some blood-and-bone manure: these are considered suitable forms for manuring swedes. Now that we cannot depend on obtaining basic slag, basic superphosphate should be used as a substitute in cases where slag is recommended. Garton's Superlative, Sutton's Champion, Monarch, Incomparable, and John Bull are standard varieties of swedes, the last-named being specially suited to shallow soils.

Turnips.—Turnips are naturally suited to lightish loams. Of the two types the yellow-fleshed are slower growers, more nutritious, and better keepers than the white-fleshed. The habit of growth of turnips is shallow-rooted, hence a phosphate, and that in readily available form, is required. Nitrogen is not so essential as in the case of swedes. Where the loam is specially light the addition of some potash, up to ½ cwt. per acre, will give good results as a rule. For turnips the same forms of manures as for swedes are suitable, though in slightly smaller quantities, especially as regards the nitrogenous manure blood and bone. In the feeding of turnips, which contain over 90 per cent. of water, for maximum results it is good practice to feed along with the roots some dry feed, in the form of hay, pea-straw, or oat-straw. Even wheat-straw would be found of value to offset the excessive succulency of the turnips. The feeding of some dry feed therewith also balances the ration to some extent, thereby causing greater feeding-use to be made of this root crop.



THE DEPARTMENT'S MAIN WINTER SHOW EXHIBIT, 1915.—GENERAL VIEW.



ROOTS AND CEREALS FROM CO-OPERATIVE EXPERIMENTAL PLOTS.—DEPARTMENTAL WINTER SHOW EXHIBIT, 1915.

When club-root is found attacking turnips or other cruciferous crops, such as cabbage, kale, mustard, &c., lime is required to kill the organism lurking in the soil. At least 2 tons of burnt lime is required to bring about this destruction, provided the soil can stand this heavy dressing of that form of lime. Failing the use of lime, cruciferous crops should not be grown on the area for seven years, as it takes this time for the organism to disappear. Crops like mangels, clovers, &c., should be grown instead. Potash and other alkaline manures supplied to non-cruciferous crops should contribute largely toward the eradication of club-root, failing the use of lime in agricultural practice.

Rape.—Rape requires stronger soils than do swedes or turnips. It is a crop that is grown for stem and leaf, hence it requires more nitrogen (a characteristic of strong soils) than do the root crops. It does, however, require a phosphate to some extent. In general, it requires about the same manuring as swedes—phosphates suited to the different soil-conditions as enumerated above, with a little more nitrogen. Thus a slightly larger quantity of a nitrogenous manure, such as blood and bone, than in the manuring of swedes should be used. The growing of mustard with rape is sometimes practised, with the object of offsetting the tendency of the rape to "blow" stock, also as a tonic for sheep.

Kale.—Kale is grown for its abundant growth of stem and leaf, hence, where a manure is called for (on the lighter soils), a nitrogenous phosphate such as blood-and-bone manure is well suited for the effective growth of this crop. Buda, Thousand-headed, and Jersey kale are three useful varieties, especially for early spring feed. Buda kale makes a good succulent feed for dairy cattle, while Thousand-headed kale is reputed to be of special value to ewes at lambing. Kale is seeded at the rate of 10 lb. per acre broadcast, or 4 lb. per acre in drills.

Legumes.—Legumes (clovers, vetches, peas, lucerne, &c.) are specially rich in a nitrogenous substance called protein, which is a great flesh-former. This class of forage crops is of special value to the soil because of the power the plants possess of drawing the nitrogen from the soil-air by means of the bacteria associated with the nodules or knobs found on the roots of these plants. Their growth enriches the soil in nitrogen. Legumes are specially stimulated in growth by lime. As manures they require firstly potash and to a lesser extent a phosphate. As has been stated above, potash plays an important part in the formation of sugars and starches. These, formed within the legume, migrate to the root-hairs of the plant and feed or stimulate the nitrogen-gathering

bacteria, and the bacteria, being so stimulated, increasingly draw nitrogen from the air and pass it on to the plant. This is a case of symbiosis, or living together for mutual benefit. It is, in the case of legumes, highly important to productive agriculture.

Lucerne is a crop that is destined to play an important part in the agricultural economy of New Zealand, providing as it does at least three cuttings of rich fodder in a single season, and lasting a number of years. For its successful growth the soil must be well drained, the permanent water-table being at least 5 ft. from the ground-surface. The lower the water-table the greater the range of root-system, hence the more will this great naturally deep-rooted crop draw from the reserve of plant-food in the lower reaches of the subsoil. The soil should be also well limed—on the average ½ ton per acre of burnt lime, or its equivalent 1 ton per acre of carbonate of lime. The soil should also be absolutely clean. The previous growing of drilled root crops, and these well cultivated, is a good means of cleaning the land. If this is not thoroughly effective a smother-crop of rape, heavily seeded, should complete the cleaning. Another method of cleaning the land for lucerne is to cultivate with cultivator and tine-harrow from early spring to late summer, killing the weeds as the weed-seeds germinate. When the weeds have apparently been all destroyed the lucerne should be sown. In parts of America lucerne is sometimes seeded with a nurse-crop of half a bushel per acre of barley, preferably the beardless barley. The barley shelters and stimulates the young lucerne and tends to check the growth of weeds. On soils that have never grown lucerne before, unless it be rich alluvial land, it is advisable to inoculate the ground with the species of bacteria peculiar to lucerne. In rich alluvial land there is an abundance of available plant-food in the form of nitrates, and when lucerne is seeded thereon it finds plenty of soluble food, and hence performs in the early part of its growth the function of an ordinary plant. On less fertile lands such readily available plant-food is not so plentiful, and lucerne sown thereon requires to be assisted from the outset by nitrogen-gathering bacteria introduced into the soil by inoculation, which bacteria associate themselves with the plant per medium of the nodules or knobs formed on its roots. As manure for lucerne, 3 cwt. basic superphosphate and 1 cwt. sulphate of potash per acre will be found satisfactory. Seed should be sown at the rate of 15 lb. to 20 lb. per acre broadcast, or 12 lb. to 15 lb. in drills. The crop should not be grazed the first year, and in subsequent years it should be grazed carefully. Sheep especially should be carefully handled on lucerne, as they tend to feed close, and by nibbling the young shoot at the base of

the plant tend to injure the crop. In the first year of growth, or when the crop is not well established, injudicious grazing with sheep will soon settle the crop. There is also the tendency of lucerne to blow sheep and cattle, necessitating the grazing of the crop for short periods only. This points to lucerne being primarily a soiling (green-feed producing), haying, and ensiling crop. Besides, as man is a better harvester than any animal can be, it is desirable that he periodically cut and utilize every part of this rich flesh- and milk-producing fodder.

Supplemental Pasture Mixtures. — To augment the scant grass of winter and early spring or dry periods the following mixtures per acre will be found invaluable: Italian rye (20 lb.) and vetches (1 bushel); Italian rye (30 lb.) and cow-grass (4 lb.) — for strongish soils. Oats (1½ bushels) and peas (1½ bushels); Cape barley (2 bushels) and Scotch vetches (1 bushel); Emerald ryecorn (1½ bushels) and vetches (1 bushel). The two latter mixtures are specially suited for winter and early spring feed. Prairie-grass (30 lb.) and crimson clover (4 lb.). Western Wolths is also a good supplemental pasture crop, but requires to be grown on strong land, as it is somewhat exhaustive. It is seeded at the rate of 30 lb. per acre.

Ensilage.—The making of ensilage, preferably by use of a silo, is an excellent means of conserving and utilizing green fooder crops of all kinds, thereby making for agricultural economy. Mature maize fodder, maize (2 parts by weight) and lucerne (1 part), and green crops of all kinds are highly suitable for making ensilage, the two first-named being specially valuable. Green crops, either singly or in mixtures, that are not required for soiling or for pasture can to advantage be made into ensilage, and so fodder can be conserved for use during dry periods or winter.

ECONOMIC FEEDING.

The economic feeding of forage crops is a matter worthy of consideration by dairy-farmers particularly. The subject is dealt with by me in a departmental bulletin entitled "Forage Plants and Animal Nutrition" (No. 52, New Series). The nutritive values of various forage crops have been there calculated from the research work of Kellner and others. Standard feeding ratios for various classes of stock have been adopted, and the feeding of various crops in proper proportion so as to provide an animal with a "balanced" ration is a matter of calculation from the tables of nutritive values provided. A "balanced" ration means a definite prescribed ratio between the digestible protein substances and the digestible

carbohydrates (sugars and starches) for a particular class of animal. For ruminant animals in general, irrespective of the use to which they are put, a "balanced" ration would consist of a fodder or fodders possessing a nutritive ratio of 1 : 8 to 10—that is, a ratio of 1 part digestible crude protein to 8 to 10 parts digestible starches and sugars. This would be found in two parts by weight of maize to 1 part lucerne, the nutritive ratio of which is 1 : 8·04. In ensilage form especially this is considered an ideal balanced ration for ruminants. Mixed grasses and clover possess practically a similar "balanced" ration—a nutritive ratio of 1 : 7·72. For maximum milk-production dairy cows require an albuminoid ratio of 1 : 7—that is, a ratio of 1 part digestible protein (not crude) to 7 parts digestible sugars and starches. This "balanced" ration for cows in milk is found in 1 part by weight of mature maize fodder and 6 of lucerne, with an albuminoid ratio of 1 : 7·5; or, better still, in 1 part maize and 7 lucerne—ratio 1 : 7·39. Millet 1 part and lucerne 6 parts is also approximately a "balanced" ration—ratio 1 : 7·32. Ryecorn fodder 2 parts by weight and vetches 1 part possess practically a similar ratio—1 : 7·4. Italian rye 1 part and red clover 1 part by weight possess a ratio of 1 : 7·8. Italian rye 1 part and vetches 1 part give also approximately a "balanced" ration with a ratio of 1 : 7·61. Italian rye 1 part and lucerne 2 parts possess a ratio of 1 : 7·16 — practically a "balanced" ration for dairy cows. Italian rye and cow-grass in equal parts possess a nutritive ratio of 1 : 5·35, which would be practically equivalent to an albuminoid ratio of 1 : 7—the "balanced" ration for dairy cows in milk. The feeding of lucerne with certain other forage crops tends to "balance" the ration, and when certain grasses like prairie-grass are grown with it this tendency to "balance" results; also it minimizes the danger of "blowing" stock. When lucerne is the sole ration of the animal a portion of the valuable protein goes into the manure rather than into the body, but when this rich fodder is balanced with a fodder high in starches and sugars all the protein goes into the body and forms flesh or milk.

Thus the science of feeding can be applied in our farm practice, and its study and application is of interest to the dairy-farmer who is desirous of making every particle of fodder grown do its work.

The management of the Ruakura Farm of Instruction has been taken over by Mr. T. W. Lonsdale, who has held the position of Manager of the Moumahaki Experimental Farm during the last few years. In the interval between the resignation of Mr. P. McConnell, late Manager, and the appointment of Mr. Lonsdale, Mr. A. W. Green, Horticulturist at the farm, has filled the position of Acting-Manager.

THE SUBTERRANEAN GRASS-CATERPILLAR.

A. H. COCKAYNE.

ALTHOUGH the main insect injury to grass land is performed by the various species of grass or white grubs (*Odontria*), another group of native insects is, in the larval form, the cause of widespread damage. These can well be termed the subterranean grass-caterpillars, to distinguish them from that numerous group collectively known as the army-worms or grass-caterpillars which spend the major portion of their existence above ground.

The subterranean grass-caterpillars are the larvæ of a genus of native moths known as *Porina*, of which there are several species, *P. umbraculata* and *P. cervinata* being the two that are most destructive to grass land. During the present winter these two species have been present in immense numbers on many pastures and lawns in the Wellington district. It is more than probable that both these species are widely distributed at the present time in both Islands, but so far my personal observations concerning them have been restricted to the Wellington Province, notably in the neighbourhood of Wellington and that of Palmerston North.

The various species of *Porina* in the larval stage form burrows in the soil, and remain during the day at various depths, being generally found at from 1 in. to 6 in. below the surface. Unlike the true grass-grubs, they do not feed extensively on the roots of pasture plants, but at night-time come to the surface and feed on the herbage just on a level with the ground. While feeding they cover themselves with a protective film of soil-particles loosely held together with strands of silk. After feeding they again descend into the ground.

The larvæ of *P. umbraculata* and *P. cervinata* are very similar, and vary from 1½ in. to 4 in. long. They also vary somewhat in colour, but are generally dark-coloured with black heads, and with the ventral portions of the segments lighter in hue than are the dorsal. Pupation normally occurs about September, and the moths are on the wing from the latter part of October until well on in the new year.

At the present time the larvæ abound in many grass lands in enormous numbers, as many as forty to the square yard having

LARVÆ OF SUBTERRANEAN GRASS-CATERPILLAR (NATURAL SIZE).

SHOWING EFFECT OF SUBTERRANEAN GRASS-CATERPILLAR.

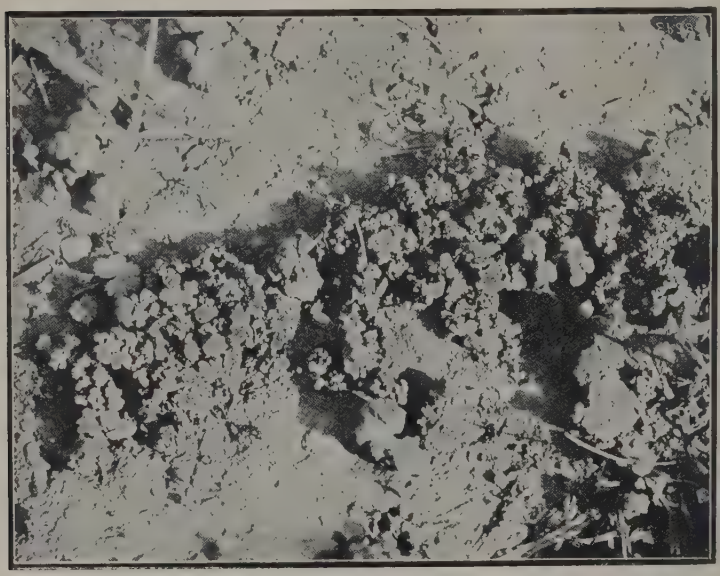
Photos by E. Bruce Levy.]

been counted. As they are voracious feeders, the damage they inflict is very considerable, and where they are at all abundant the grass appears to be killed out, or, at any rate, large bare patches are formed. In many instances the damage caused by *Porina* is attributed to the grass-grub. *Porina*-infested land can, however, be readily distinguished from that affected with any of the species of *Odontria*. In the first place the ground is not so spongy to the tread as when *Odontria* larvæ are plentiful; again, the casts formed when the larvæ are feeding are always seen dotted about the surface of the ground. These casts superficially resemble those formed by ordinary worms, but are easily distinguished by being much more friable and also by being loosely held together by silk.

The injurious effects of the various species of *Porina* are not restricted to grass lands alone; and the larvæ are often particularly destructive to various vegetables and root crops, such as potatoes and turnips. One species, *Porina signata*, is also common in flax swamps, and bores quite large holes in the butts of the flax-plants, often causing a destructive rot to develop.

Like all subterranean insects, the various species of *Porina* are exceedingly difficult to destroy, and at the present time a practical method of control on a large scale is lacking. Thanks to the Wellington Golf Club and the Professorial Board of Victoria College, who have very kindly allowed the use of their grounds for experimental purposes, I have been enabled to carry out a large series of experiments in the control of *Porina*. In this connection I have also to thank Mr. B. C. Aston, who has not only given me most valuable advice, but has also devoted a considerable amount of time to the preparing of material for testing purposes. Although, unfortunately, the majority of these experiments have to be ranked as partial failures, an excellent method for the fumigation of small areas such as lawns with carbon disulphide has been devised. The experiments so far have not yet reached any stage of finality, but the really good results obtained with carbon disulphide in the control of *Porina* justify the publication of the method adopted.

It was recognized that the ordinary method of soil-injection as advocated for the distribution of carbon disulphide was too laborious for general adoption even over comparatively small areas. It was therefore considered that if the carbon disulphide could be employed in an emulsified form and applied diluted in water



CAST OF SUBTERRANEAN GRASS-CATERPILLAR (NATURAL SIZE).

SHOWING EFFECT OF SUBTERRANEAN GRASS-CATERPILLAR.

Photos by E. Bruce Levy.]

good results should be secured. Various emulsifying agents were tried, and the best results were obtained by mixing 3 parts of carbon disulphide with 1 part of phenyle, and using 2 oz. of this mixture in 2 gallons of water for every square yard of ground treated. The dilute emulsion was poured on the surface of the ground with an ordinary watering-can, and within twenty-four hours all the Porinas in the treated area were completely killed without any injury being sustained by the grass. It is, of course, recognized that this method is quite inapplicable on a large scale, but over small areas the results were so satisfactory that its adoption can be confidently recommended. The best time to carry out the method is perhaps in early autumn as soon as ever any damage is discernible.

LUCERNE VARIETIES IN CENTRAL OTAGO.

THE following note on a lucerne variety test carried out during the past season on an experimental plot of 2 acres at the Matangi Orchard, Earnscleugh, Central Otago, has been supplied by Mr. G. M. Marshall, the owner of the property. The varieties under test were Spanish, Hunter River, Peruvian, Turkestan, and Dryland.

"The past season has been a very unfavourable one. During the early part of it we had a succession of heavy frosts; these were followed by high winds from the north-west and south-west; then came a long period of drought. Yet throughout these adverse conditions the Spanish variety gave the best results. One outstanding feature is the rapidity with which it starts into fresh growth after each cutting and maintains a lead of from 4 in. to 6 in. ahead of all other varieties under test. The weight of hay produced is far greater than that of the other varieties, on account of the extra length and the very heavy leafage which the Spanish variety produces. It also stands up better during the cold weather than the other sorts, starts into growth earlier in the season, and maintains its growth later. In my opinion it is the best lucerne growing in Central Otago. Hunter River ranks second, while Peruvian, Turkestan, and Dryland do not give anything like the crop that the Spanish does. This year we had three cuttings for hay, and fed off the fourth."

POTASH AND THE GREAT WAR.

MONEY IN ASHES.

B. C. ASTON, F.I.C.

THE importance of conserving our natural supplies of potash in New Zealand, in order that the enemy, who benefits financially by every ton of potash salts which we import from Germany (as is now permitted), may not receive more British gold than is absolutely necessary, will be apparent to every loyal farmer. Many sources of potash fertilizers outside the great German monopoly at Stassfurt have been suggested. It is reported that large deposits have recently been discovered in Spain, and at the writer's instigation this possible source is being inquired into. The continuous harvesting and treatment of seaweeds, which is proposed in America, is perhaps impracticable for New Zealand's rocky and storm-beaten coasts; but after storms quantities of seaweed, containing nitrogen and potash (both required for potatoes and other potash-loving crops), might be gathered and profitably utilized on lands adjacent to the littoral.

Large deposits of chloride of potash have been known in the Mulhausen region of Upper Alsace since 1904. Engineers have computed that there are fifteen hundred millions of tons available on a surface of 120 square kilometers. Readjustment of the territory in the future may allow these deposits to come on the market, competing with those of Stassfurt.

Notes in the last two issues of the *Journal*, reprinted from English agricultural papers, show how keenly the matter is being watched at Home. Thus, the ash of bonfires arising from hedge-trimmings, weeds, &c., contained 11 per cent. of potash, and would be worth in New Zealand at the present time at least £5 per ton. It must be remembered that the very part of the plant richest in potash — viz., the young growing parts — is that discarded in trimming hedges, &c. Common-broom ash contains 33 per cent., and furze (gorse) 28 per cent. Each per cent. in a ton is worth 9s., hence a ton of gorse-ash would be worth $28 \times 9 = 252$s. = £12 12s.

The great fault in treating ashes is that they are not collected as soon as produced, and the potash carbonate, being very soluble and capable of attracting moisture (deliquescent), runs off in the first shower and is lost.

The writer has from time to time made analyses of various ashes from timber-mills, the results of which are here tabulated. It must

be remembered that they were not necessarily collected with caution, and it is desirable that analyses should be made on samples which are known to have been so collected.

The values given are calculated on the assumption that the unit (1 per cent. in a ton, or 22·4 lb.) of each constituent is worth the following sum, viz.: Phosphoric anhydride, 2s. 6d.; potash, 9s.; lime, 4d.

The writer will be obliged if any one interested will take the trouble to collect fresh ashes of one kind of timber at a time, carefully protecting them from wet, and finally sending to him, with a letter of advice, a fair sample of, say, ½ lb., addressed to Box 40, G.P.O., Wellington.

ANALYSES OF WOOD-ASHES.

Sample No.	Origin.	Potash (K_2O).	Phosphoric Anhydride (P_2O_5).	Quicklime (CaO).	Carbonate of Lime ($CaCO_3$).	Value per Ton.
		Per Cent.	Per Cent.	Per Cent.	Per Cent.	£ s. d.
G29* ..	Rimu ..	4·00	2·00	48·00	100·0	2 19 8
G473* ..	Kahikatea ..	4·23	6·40	37·00	66·0	3 6 4
K100† ..	Rata	30·06	Not stated	Not stated	..	13 10 6
L961‡ ..	Timber-mill ash	2·75	,,	8·68	15·5	1 7 8
M39‡ ..	Sawmill ash ..	1·40	,,	Not stated	..	0 12 8
M57‡ ..	Kauri-slab ash§	0·30	0·20	6·89	12·0	0 5 6
M58‡ ..	Kauri, from saw-dust furnace	1·48	0·40	9·97	18·0	0 17 8
C1072 (1)‡	Ash from furnace	1·13	0·77	Not stated	..	0 12 0
(2)‡	,,	0·87	0·74	,,	..	0 9 4
G123‡ ..	Wood-ash from Rangataua	5·37	Not stated	47·34	85·0	3 4 2
G124‡ ..	Ditto ..	0·79	,,	48·94	87·5	1 3 6
G125‡ ..	,, ..	1·06	,,	52·40	94·0	1 7 0

* 1906 Report, p. 110. † 1907 Report, p. 188. ‡ Not published.
§ Saturated with moisture (8·09 per cent.).

Sudan Grass: A Warning.—Mr. E. Clifton, New Zealand Trade Commissioner, San Francisco, supplies the following note:—

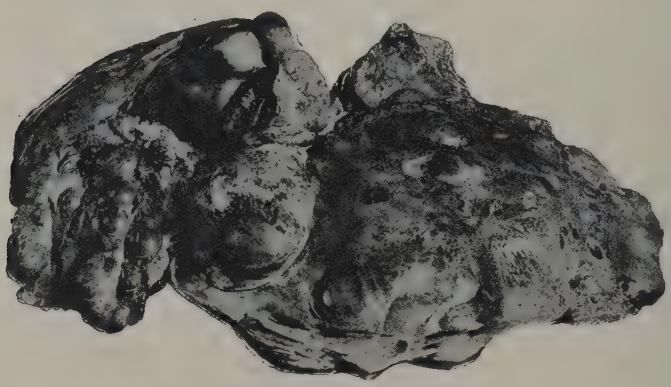
It is observed that in New Zealand considerable attention is being directed to Sudan grass. This is an annual and a sorghum, in appearance and in seed very similar to the objectionable Johnson grass. Sudan grass is accepted here as valuable. It supplies a wealth of forage that is relished by stock. In itself it is useful and desirable. There is, however, the very serious limitation that this seed is often mixed with that of the Johnson, and almost impossible of differentiation. It is also claimed that these sorghums to a great extent hybridize. In conversation with a professor from one of the agricultural colleges he stated that he avoided the recommendation of Sudan grass on account of the danger of the mixture with the Johnson grass. The latter is actually a weed; it is not palatable to stock, and from its root-system it is also impossible of eradication.

HYDATID DISEASE IN A DOG.

H. A. REID, F.R.C.V.S.

An aged collie dog was brought to me by a farmer who related that the animal had been suffering from obstinate constipation—a condition which the administration of enemata and free dosage with castor-oil had failed to relieve. The dog's belly was much distended, and the owner thought that this appearance was the result of eating an excessive quantity of meat.

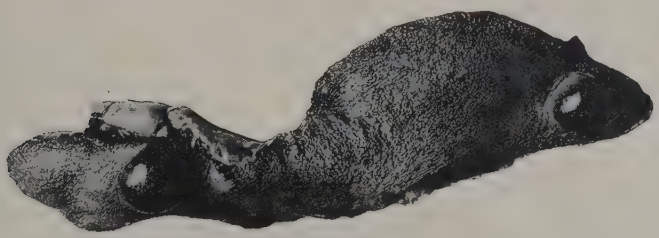
Examination proved the actual cause of this condition to be due to the accumulation of dropsical fluid in the abdominal cavity.



LIVER OF DOG INFECTED BY ECHINOCOCCUS POLYMORPHOUS.
Photo by E. Bruce Levy.]

I informed the owner that the dog was suffering from disease of the liver, and that, in consequence, the normal circulation of the blood was seriously embarrassed. Little hope could be given of ultimate recovery. In order to relieve immediate symptoms the abdomen was tapped and about 2 quarts of watery blood-stained liquid drawn off. The constipation was overcome by a dose of 1 dram of aloin and 3 grains of calomel. The dog's health for a time improved, but the dropsy returned, and the animal became extremely emaciated, and finally died from exhaustion.

Post-mortem examination revealed a very interesting condition. The liver was enlarged, weighing 3 lb. 9 oz., and the gall-bladder was greatly distended. The liver was the seat of very extensive infection by *Echinococcus polymorphous*—the hydatid or cystic stage of *Taenia echinococcus*, a tapeworm frequently found in sheep and cattle dogs. The spleen also contained two *Echinococcus* cysts. The remaining organs appeared to be normal. On opening the bowels numerous specimens of *Taenia echinococcus* were recovered.



SPLEEN OF DOG, SHOWING TWO ECHINOCOCCUS CYSTS.

Photo by E. Bruce Levy.]

Although hydatid disease from infection by *Echinococcus polymorphous* is known sometimes to occur in dogs, the condition is rare. The case illustrates a remarkable departure from the usual life-history of these parasites, which generally require two hosts of different species in order to complete their development.

Readers of the *Journal* will find an account of the general features of hydatid disease in the issue for July, 1914.

The vacancy caused by the retirement on superannuation of Mr. S. F. Anderson, Vine and Wine Instructor, Orchards, Gardens, and Apiaries Division, has been filled by the appointment of Mr. A. H. Mazure, late of the Champsane Vineyards, Forbes, New South Wales. In addition to his Australian experience, Mr. Mazure has had viticultural training in France. He was born in South Australia.

Two of the learners at the Weraroa Experimental Farm, J. M. Smith and W. Thompson, were entered for a milk-testing competition held in connection with the recent Palmerston North Winter Show. Out of fourteen competitors J. M. Smith was placed first with 98 per cent. of marks, while W. Thompson came fourth with 94 per cent. Both scored full marks orally. The lads are both fifteen years of age, and have only been on the farm for about six months. Their experience in milk-testing has been gained entirely in the farm dairy.

GROWING CUCUMBERS UNDER GLASS.

W. H. TAYLOR.

SEVERAL correspondents have asked for information on the cultivation of cucumbers under glass, but none of them has stated what means they wish to employ. I presume they have not heated houses. For other structures, whether houses or frames, a hotbed is a first necessity. Cucumbers cannot be got early without heat in which to raise the plants. The most economical way to raise the plants is on a small bed made up in a greenhouse. A small frame with a light about 3 ft. square will raise a lot of plants. A good dray-load of manure will make a bed large enough for the purpose. It would be useless outside, because wind would drive the heat out of it. It is not wise to raise the plants on the beds on which they are to grow and mature unless it is late in spring, for the supply of heat would be exhausted before natural heat is great enough to render artificial heat unnecessary.

Different kinds of soil are successfully used to grow the plants in. Preference should be given to good fibry loam, which means turf cut from an old pasture and stacked till the grass is dead. I prefer to use this material with no addition. If inferior soil lacking in fibre must be used some enriching material is necessary. In such cases I prefer to use horse-droppings without straw. It will be well if they have not heated. Manure for the bed should be turned over several times, otherwise the heat will not last long enough.

Assuming the bed to be ready for use, the first thing to be done is to fill some 3 in. pots with soil. If the loam before mentioned is available there will be no need to mix anything with it. The loam should be in a moist but not wet state. The pots thus filled should be plunged into the bed and left for a day till the loam is warm. Then put one seed in each pot, or, to make sure of securing a plant, put in two seeds, and destroy the weaker plant if both seeds germinate. One end of the seed is narrow and wedge-shaped. The seed should be pressed into the soil upright with this wedge end down. This is important, for if the position were reversed, the seed-leaves would start downward, and would have to turn a half-circle to get up.

The frame may require light shading, so as to render watering unnecessary, otherwise failure of the seeds might result. When the young plants are growing they must have plenty of light. It is not likely that any shade would be required if the frame were in a greenhouse. As the plants advance in growth watering will, of course, be necessary. The water should be a little warm. The handiest plan is to keep a can of water in the frame where it will get sufficiently warm for the purpose. When the roots have filled the pots the plants should be moved into 5 in. pots. The soil should be warmed on the bed before potting the plants. As soon as the plants are growing freely the top of each should be nipped off to cause them to branch. They will be ready for putting out when the pots are filled with roots.

In the meantime preparation of the permanent or growing bed and soil should be going on. The shift into 5 in. pots is not indispensable, but is a decided advantage. The length of time between sowing the seed and the final planting-out may be from three to five weeks, according to the amount of heat and the skill of the grower. The manure for the bed should be in course of preparation for at least two weeks, being turned over frequently. If the bed is for a frame it should be 6 in. wider than the frame all round. Do not tread the manure down, but beat it firm with a fork. When the bed is made up put the lights on and shut them up close. This will cause the heat to rise quickly. When this has come about open the lights a little to let the vapour out. Wait two or three days to let the rank heat pass before planting. In the meantime about a bushel of loam should be placed under each light to get warm. When ready put two plants on each pile. Future training is to lead a branch towards each corner of the frame, stopping as required to cause them to make fruit-bearing laterals, and to fill the frame with growth. The bearing laterals should be stopped beyond each fruit, and all male flowers should be picked off to prevent fertilizing for seed-bearing, which is very exhausting. After a time, and before growth has advanced much, roots will peep through the soil. A further supply of soil should then be added. When the roots again begin to appear a still further supply should be added, and so on till the frame is full of soil. When fruit has grown to some size liquid manure must be applied. This may be made from horse-droppings, cow-manure, or sheep-manure. Use enough manure to make the water a colour between that of ale and porter. Give manure-water on alternate days.

The treatment for a greenhouse is very similar, but success is not so sure in amateur hands. If the plants are started early

a hotbed is as necessary in a house as in a frame, and it is at any time a great advantage, as it gives a quicker and stronger growth. A trellis must be provided on which to train the growth. Keep this about 12 in. from the glass. Each fruit should be supported with a strand of raffia, or the weight will break the laterals. In frames there is but little air-space, and the exhalations keep up a constant state of moisture. This is very necessary, and must be accomplished in a greenhouse by frequent damping and overhead spraying at closing-time. A fair amount of ventilation without draught should be given. Keep a keen watch for red mite; this is a very small rust-coloured insect, and it is easily overlooked. If a moist atmosphere is maintained it is not likely to be troublesome. If, however, it appears, use "katakilla" at once, for if it is allowed freedom it will totally destroy the plants.

This article is but a rough outline of cultivation. Many other details might be dealt with, as, for instance, lengthening the life of a bed, protection from woodlice, and renewing plants when lost. These may possibly supply matter for a future article.

Every man and woman within the Empire is being asked to produce what he or she is best able to produce to their utmost capacity, and to work the longest hours of which they are capable. We in New Zealand are now approaching another season, and it is the duty of every farmer throughout the country to so organize things that his farm will produce during next year the utmost of which it is capable.—*Mr. J. A. Johnstone, addressing the annual meeting of the New Zealand Clydesdale Society, 1915.*

Recently a number of orchardists in New Zealand offered donations of fruit for use of the Expeditionary Forces at the front. These generous offers, unfortunately, could not be taken advantage of on account of suitable cool storage on the boats not being available. With the view, however, of taking advantage of these donations, so far as the Canterbury District was concerned, the officers of the Christchurch branch of the Orchards, Gardens, and Apiaries Division of the Department proposed that the fruit be sold in Christchurch, the proceeds to go to the Belgian Relief Fund. The proposal had the hearty support of the fruitgrowers interested, and also a number of beekeepers, and a large sale of fruit and honey was conducted at Christchurch. The sale proved most successful, and resulted in the sum of £114 6s. 7d. being realized, which was handed over to the fund. The names of the various donors, to whom thanks are due, appeared in the Christchurch papers.

SEMI-OFFICIAL TESTING.

W. M. SINGLETON.

ILLUSTRATIONS of a further quartet of cows which have qualified for certificate are given in this issue. Following is some note and comment concerning these animals and their performances:—

The Jersey cow Worksop Belle, belonging to Mr. Thomas Dixon, of Masterton, commencing her test at the age of 3 years 86 days, produced in 365 days 13,506·13 lb. milk, containing 624·34 lb. butter-fat. This record displaces as class-leader that of Lady of Collingwood, which gave in 365 days 603·05 lb. fat, making four three-year-olds over the 500-lb.-fat mark, and a further two three-year-olds over the 600-lb.-fat limit. Worksop Belle dropped a calf in 65 days after the expiry of her 365 days. She is a daughter of M.L.C. While Worksop Belle has produced a splendid record, it probably would have been considerably augmented had the cow experienced favourable conditions throughout her milking-period. Dry weather affected her pasture very much, and for some of the time she had no food other than burnt-up grass.

The Jersey cow Snow Bird, belonging to Mr. C. A. Willis, of Pukekohe, commencing her test at the age of 2 years 5 days, produced in 352 days 8,135 lb. milk, containing 395·16 lb. fat. She calved again in 375 days after the start of her testing-period. From the viewpoint of production this is a very creditable record, and, added to this distinction, her dairy type has placed her at the head of a show class for females in milk. She is a daughter of Mr. A. Moreland's imported bull Golden Swan.

Spray II of Cambridge—an Ayrshire cow owned by Messrs. J. and C. Watt, of Cambridge—commencing at 13 years of age, produced in 320 days 413·27 lb. butter-fat. She was depastured with the ordinary milch herd, and for much of the time got no special feed or attention. She dropped her subsequent calf six weeks after the expiration of her testing-year.

The Friesian cow Burkeyje Sylvia Posch was imported from Canada by Messrs. Gunn and Sinclair, Raetihi, and was transferred to Messrs. H. North and Sons, Omimi. In their possession she has placed a very fine record to her credit. Commencing at the age of 1 year 350 days she has produced in 365 days 16,646·3 lb.

WORKSOP BELLE.

SNOW BIRD.

SPRAY II OF CAMBRIDGE.

BURKEYJE SYLVIA POSCH.

milk, containing 505·27 lb. butter-fat. Although commencing as a yearling, her production places her record as second-best in the class for junior two-year-olds. At the Central Canada Exhibition at Ottawa, about eighteen years since, the grandam and the great grandam of this heifer were entered in the butter-fat competition. The writer was assisting with the testing, and remembers the great grandam taking the red ticket, with the grandam second, while a sister or daughter of the grandam won third place.

WHITE MUSTARD FOR GREEN-MANURING.

A. W. GREEN.

AN interesting demonstration of the employment of white mustard for green-manuring is in progress at the Ruakura Farm of Instruction. The location is field No. 6, which is of a very even character throughout, the soil being of a light sandy nature, on a gravelly subsoil. The field was devoted last season to grain variety tests, including a barley manurial trial. The object of growing the mustard — the white variety — is to prepare the soil for a potato crop.

Preparatory to seeding, the land was ploughed out of stubble with a swamp-plough, then rolled and double tine-harrowed. No manure was applied with the mustard. The seed was sown broadcast on the 2nd March, 1915, at the rate of 10 lb. to the acre.

The crop is now* ready for ploughing under. It is probable that no crop yet grown on this farm has exhibited such marked variations in height of growth and size and vigour of plants. Such variations can be attributed to either of two causes—namely, the influence of previous soil-treatments or the influence of previous crops.

Twelve months ago several loads of rotten stack-bottoms were carted out and spread over a portion of this field. It is on this area that the heaviest and healthiest crop of mustard is found. The previous crop here was one of oats. Adjoining this is the area devoted last season to barley manurial tests. Needless to say, no rotten stack-bottoms went on to these plots, but artificial manures, varying in weights from ½ cwt. to 3¼ cwt. per acre, were applied

* Mid-June.

with the barley. It is in this area that the mustard is the poorest. The difference in growth between this and the previously mentioned portion of the crop is remarkable. No greater contrast can be found in the field.

Between each of the barley manurial plots a space 4 ft. wide was left to divide off the plots. This space received no manure, but during the summer was kept cultivated to keep down weeds. Although the pegs have been removed, the former locality of every barley plot can at present be distinguished by the variations in the growth of the mustard. Along the cultivated spaces the mustard is three times as high, darker and richer green in colour, and much stronger. The advantage in this case is largely due to summer cultivation. Had a heavy barley crop been harvested this amount of variation might have been expected, but, owing to a long drought, the crop was so slight that little of the manure applied would be removed from the soil. As previously stated, the influence of previous crops affected the growth of the mustard. This is exemplified on the area devoted to cereal variety tests last season.

The soil-treatment was the same for all. Plots were arranged in series in this order: (A) Oats, (B) wheat, (C) barley, (D) rye.

In every case where barley was growing the mustard has made the least growth, so that the barley plots can be readily followed throughout. After oats the mustard is most vigorous, and forms a striking contrast to the former plots.

MINERAL-PHOSPHATE BONUS.

ATTENTION is drawn to the new *Gazette* notice, reprinted at the end of this issue, offering a bonus for the discovery and working of deposits of mineral phosphate within the Dominion. The amount of the bonus has been doubled, and now stands at £1,000 if the deposit is on land in which the Crown is entitled thereto, and £500 if on other land. It will also be noted that the previous condition requiring the deposit to be sufficient to meet all ordinary demands of the Dominion for five years has been deleted. It is provided that if a small deposit is discovered a proportion of the bonus will be paid on and in accordance with the recommendation of the examining committee.

SEEDS AND THEIR IDENTIFICATION.

CONTINUED.

E. BRUCE LEVY.

Ox-eye Daisy (*Chrysanthemum leucanthemum*).
Yarrow (*Achillea millefolium*).
Ragwort (*Senecio Jacobaea*).
Groundsel (*Senecio vulgaris*).
Hawkweed (*Crepis capillaris*).
Ordinary Chamomile (*Anthemis cotula*).
Field-chamomile (*Anthemis arvensis*).
Mayweed (*Matricaria inodora*).

Of these seeds ox-eye daisy and ragwort are the most dangerous. Ragwort is very rarely present in agricultural seeds, but the harmful nature of the weed when established in a pasture always warrants a careful examination of any line of seed before that line is applied to the land.

Ox-eye daisy is a very frequent impurity, especially in lines of timothy and alsike. The presence of ox-eye daisy in a line does not necessarily condemn that line, as, for instance, would Californian thistle or dodder. The seriousness of the presence of ox-eye daisy depends entirely on the type of country on which the seed is to be sown. Thus, for instance, on sheep-country ox-eye daisy is of little moment, as it is, under proper management of the pasture, easily kept down by the sheep. On the other hand, if the seed be intended for grazing or dairying country, then the presence of ox-eye daisy seed should be looked upon as condemnatory of that line.

Yarrow-seed is often included in mixtures for use on poor country and for lawns, greens, &c. Its presence in a line of seed is of no particular consequence

Hawkweed, mayweed, and the chamomiles are very common seed-impurities, but the nature of each weed is such that little consequence is attached to the presence of these weed-seeds in any line—*i.e.*, when they are present in comparatively small numbers, say, up to 1 per cent.

Groundsel-seed, although the plant is one of the commonest weeds in arable land and in waste places, very rarely occurs as an impurity in agricultural seeds. Only once or twice has it been noted in seed analysed in this laboratory.

OX-EYE DAISY.

Size: Average length, $\frac{1}{12}$ in.; average width, $\frac{1}{85}$ in.

Colour: The seed is about evenly black and white. The grooves are black, and the ridges are a creamy white, often a light dirty brown. The general appearance of a number of seeds viewed with the naked eye gives a greyish colour.

Shape: The seeds are oblong and somewhat club-shaped; very seldom slightly flattened. Extending from the base to the apex are ten conspicuous vertical ridges or ribs, which are usually of a creamy-white colour, sometimes yellowish or light brown. These ridges are made very conspicuous because of the black interspaces which form the background. These black interspaces often are slightly shiny, and are frequently dotted with minute white specks. The base of the seed is bluntly pointed, and marked more or less distinctly with a scar which marks the place of attachment of the seed to the receptacle of the seed-head. The apex is broad and rounded. At its centre is a well-developed projection which is of a light to a dark-orange colour. In form this projection is that of a short cylinder with a flat top. The seed is usually straight, sometimes somewhat slightly curved. The surface is smooth and, except for the black interspaces, dull. Ox-eye daisy when found in lines of seed often has the projection broken off. The well-defined whitish ridges mounted on the black background, however, are very characteristic and are a ready means of identifying this seed.

YARROW.

Size: Average length, $\frac{1}{15}$ in.; average width, $\frac{1}{37}$ in.

Colour: In general a silvery colour relieved by a dark, dull straw colour.

Shape: The seed is oblong and much flattened. The base is bluntly pointed, and bears a well-defined circular scar much more noticeable than that in ox-eye daisy. The apex is broad and rounded, bearing a fairly well-developed projection of a light to a dark orange colour. More frequently than not, however, this projection is broken off. On each edge of the seed is a well-defined margin which is silvery white in colour. The seed is very slightly striated (marked with

OX-EYE DAISY (CHRYSANTHEMUM LEUCANTHEMUM). ENLARGED 10 DIAMETERS.

YARROW (ACHILLEA MILLEFOLIUM). ENLARGED 10 DIAMETERS.

fine longitudinal lines). The coat which encloses the true seed is often very thin, and through it can be seen more or less distinctly the true seed, which is of a dark-straw colour. The seed is usually straight, but at times is slightly curved, the curvature being in the face and not in the side.

RAGWORT.

Size: Average length, $\frac{1}{18}$ in.; average width, $\frac{1}{48}$ in.

Colour: Pale-straw colour to a deep orange. The orange colouring is often quite blotchy and frequently extends over only a part of the otherwise straw-coloured seed. Some seeds, however, are uniformly orange-coloured.

Shape: Oblong and round in section; somewhat sausage-shaped. The base is very bluntly pointed and marked with a small scar. The apex is somewhat crown-shaped, the rim of which crown is raised and is slightly lighter in colour than the rest of the seed. The centre of the concave crown is slightly raised by a small dark projection which seldom projects beyond the rim of the crown. The seed is either curved or straight. In ragwort seeds of two forms are to be found in the same seed-head. Those on the outside are much curved and for the most part smooth; those on the inside are straight, or nearly so, and are usually more or less covered by minute hairs. At times it is not uncommon to find seeds very much flattened and distinctly curved, the curvature being in the flattened surface and not in the edge. Such seeds are found on the very outside of the seed-head. Extending from the base to the apex are from eight to ten dark grooves more or less distinct. The surface of the seed is dull and often studded with minute hairs, which hairs, when present, are for the most part situated on the edges of each groove. Under a simple lens, however, their arrangement cannot be seen. The smooth seeds are often slightly glossy.

GROUNDSEL.

Size: Average length, $\frac{1}{10}$ in.; average width, $\frac{1}{60}$ in.

Colour: Light to a dark brown. A number of seeds together viewed by the naked eye give a greyish tinge.

Shape: Oblong and round in section; much elongated; usually straight, very seldom slightly curved. The base is bluntly pointed and is marked by a small scar. The apex is large for the size of the seed, is concave, and much expanded. At the centre of the apex is a minute projection, which, however, is hardly discernible.

RAGWORT (SENECIO JACOBAEA). ENLARGED 10 DIAMETERS.

GROUNDSEL (SENECIO VULGARIS). ENLARGED 10 DIAMETERS.

The rim of the concave apex is circular and lighter in colour than the rest of the seed. Extending from the base to the apex are nine or ten well-defined ridges of a golden colour. The spaces between these ridges are wider than the ridges themselves, and are covered by minute whitish hairs. The greyish tinge of the seeds when together in numbers is due to the presence of these hairs. The surface is dull and at no time glossy.

HAWKWEED.

Size: Average length, $\frac{1}{10}$ in.; average width, $\frac{1}{45}$ in.

Colour: Pale straw to a moderately dark brown.

Shape: Oblong and round in section, somewhat resembling a minute cog-wheel; occasionally slightly flattened. The seed is pointed at its ends, the base and the apex being about evenly so. The widest part of the seed is about midway. The base is distinctly marked with a scar; the apex is marked by a minute crown, the rim of which crown is low and often expanded. In colour the rim is a little lighter than the rest of the seed. As in ragwort, seeds of two shapes are met with in the same seed-head. Those on the outside are distinctly curved; those on the inside are more or less straight and often shorter. In the curved seeds one edge is often nearly straight, while the other is distinctly arched. Extending from the base to the apex are from ten to fourteen (usually eleven) well-defined ridges, which are a little lighter in colour than the spaces between them.

ORDINARY CHAMOMILE.

Size: Average length, $\frac{1}{18}$ in.; average width, $\frac{1}{35}$ in.

Colour: Light straw to a dark brown; usually a moderately dark brown.

Shape: A rough oval, of which the larger end is the apex. At the base the seed is drawn out into the form of a short cone more or less regular in form. This cone is not a continuation of the outside edge of the seed-coat, but seemingly a continuation of the inside of the coat. The cone is smooth and light in colour. The outside edge of the coat is often turned back to form a flange round the base of the cone. The apex of the seed is broad and almost flat. At the centre is a very small projection. The seed is usually straight, but at times is very slightly curved. The surface is dull and nearly always studded with small tubercles, which are

HAWKWEED (CREPIS CAPILLARIS). ENLARGED 10 DIAMETERS.

ORDINARY CHAMOMILE (ANTHEMIS COTULA). ENLARGED 10 DIAMETERS.

arranged in ten more or less distinct ridges that extend from the base to the apex. Some seeds are very nearly smooth.

FIELD-CHAMOMILE.

Size: Average length, $\frac{1}{14}$ in.; average width, $\frac{1}{82}$ in.

Colour: A very uniform pale-straw colour.

Shape: The seed is somewhat wedge-shaped, the apex being the broader end. In section it is more or less four-angled. The base is drawn out into a cone in much the same way as is that of ordinary chamomile. The cone is much the same in colour as the rest of the seed and is smooth. The apex is broad and almost flat, rounded slightly on the edge, and hollowed out somewhat around the centre. The centre of the hollow in the apex is raised slightly by a small projection, which, however, rarely extends out as far as the edge of the apex. The surface, unlike ordinary chamomile, is smooth and not raised in ridges. From near the base arise small grooves, which extend almost or right to the apex. These grooves give the seed a wrinkled appearance lengthwise. The number of grooves is about twelve—three on each of the four faces. The seed varies greatly in size, but in general retains the same shape.

MAYWEED.

Size: Average length, $\frac{1}{18}$ in.; average width, $\frac{1}{80}$ in.

Colour: Light straw to a very dark rich brown, almost black.

Shape: The seed is oblong and somewhat flattened. The base is very bluntly pointed, almost truncate, and bears a fairly large scar. The apex is larger than the base, is broad and concave. The centre is slightly raised by a small but well-defined projection which is usually very light in colour. The rim of the cavity forming the apex is often expanded. The seed varies much in size. The smaller seeds are usually straight, the larger usually slightly curved. On each edge and down the middle of one face, invariably the concave face, is a distinct triangular ridge which extends from the base to the apex. At the apex they become united and form the expanded rim of the cavity which forms the apex. The convex face of the seed has no ridge upon it. In colour the ridges vary from a light straw to a moderately dark brown. The interspaces and convex face are a rich dark brown, almost black, in colour. The surface is dull; the convex face and the spaces between the ridges on the concave face are much roughened, being covered by minute tubercles. The ridges and expanded rim are smooth or nearly so. On the convex face the rim often elongates about the

FIELD-CHAMOMILE (ANTHEMIS ARVENSIS). ENLARGED 10 DIAMETERS.

MAYWEED (MATRICARIA INODORA). ENLARGED 10 DIAMETERS.

middle, and a rudimentary ridge is noticeable to a short distance down that face.

The following table, compiled from analyses made in the laboratory, shows the relative frequency of occurrence of these eight varieties of seeds in the main agricultural seeds :—

Agricultural Seed in which found.	Of 100 Samples examined—							
	Ox-eye Daisy was noted in	Yarrow was noted in	Ragwort was noted in	Hawkweed was noted in	Ordinary Chamomile was noted in	Field-chamomile was noted in	Groundsel was noted in	Mayweed was noted in
Perennial rye-grass ..	1	..	..	2	..	..	..	1
Italian rye-grass ..	..	..	..	3	..	..	..	..
Cocksfoot	..	..	..	25	..	2	..	..
Crested dogstail ..	6	..	..	31	..	1	..	..
Chewing's fescue ..	..	..	..	2	..	..	..	..
Timothy	20	10	4	4	19	8	..	9
Meadow-foxtail ..	2	..	..	..	..	..	..	2
Fiorin	3	54	..	..	6	..	..	..
Poa pratensis	8	4	..	2	6	..	..	..
White clover ..	5	2	..	3	7	50	..	12
Alsike	16	..	..	6	35	10	..	6
Cow-grass	..	2	..	1	..	..	..	1
Red clover	..	1	..	1	2	2	..	..
Lucerne	..	..	..	..	..	..	..	1
Lotus	6	10	..	15	..	..	..	..

Ox-eye daisy was also noted in *Poa nemoralis* and meadow-fescue.

Yarrow was also noted in sheep's fescue.

Hawkweed was also noted in Yorkshire fog and yarrow.

Chamomile was noted in *Poa trivialis*, crimson clover, and Yorkshire fog.

Field-chamomile was also noted in sheep's fescue, suckling-clover, sweet vernal, and hard fescue.

Mayweed was also noted in Western Wolths rye-grass.

SOIL ADVICE: NOTICE TO FARMERS.

CONSIDERABLE misconception appears to exist regarding the requirements of the Department in connection with advice given to farmers regarding their soils. Farmers are reminded that it is unnecessary to send in samples of soil, and they should on no account go to this trouble and expense unless requested to do so by an officer of the Department dealing with the matter. In ordinary circumstances the Department cannot undertake soil-analyses for individual farmers, such analyses being usually confined to research work on type soils. Farmers desiring soil advice should furnish particulars on the proper form for that purpose, copies of which can be obtained on application to offices of the Department.

THE FARM ORCHARD: SPRAYING.

W. C. HYDE.

In continuation of the article in the May issue of the *Journal*, the following suggestions are offered for the treatment of fruit-trees infected with blight and other pests in the class of farm orchard there described. In such an orchard will often be found one or two pear and apple trees carrying a crop badly infected with black-spot or scab, which causes the fruit to be disfigured and often mis-shapen—old offenders these, that consistently bear a profitless crop. Again, an apple-tree or two will be found affected with that disfiguring aphis commonly known as American blight or woolly aphis, large colonies of insects having established themselves on trunk and branches. Such trees, when large and consistent offenders, should be cut back to the main branches — generally some 3 ft. or 4 ft. from the ground—and about the month of September (in the North Island) regrafted with a variety that has proved itself profitable in the locality. For just as some varieties of grain are comparatively immune from smut and rust, so are there apples and pears of some of the best varieties comparatively immune from scab, and apples comparatively and totally unattractive to American blight. If this effectual treatment were more often applied there would be less complaint about fruitless endeavours, and the treatment of the rest of the orchard would be rendered a very much easier matter. The crown-grafting of such trees is a very simple matter *if done at the right time;* and in almost every locality is to be found a grower familiar with this interesting operation and generally willing to oblige.

This work accomplished, our problem is simplified. In the district with a generous rainfall the trees are possibly lichened and slimed, and generally rough. For such, an excellent treatment is adopted by the more successful growers. It is nothing more mysterious than that useful mixture known to all good housekeepers, soap and water and caustic soda—a pound or two of soap, 25 gallons of water, and 3 lb. of caustic soda. As can be imagined, this mixture will cleanse anything, and during the dormant season will not injure the fruit-tree. Apply it as soon as the leaves fall and the trees are pruned, and again in early spring. Commence spray-

ing the twiggy growth at the top of the tree, applying it thoroughly, and work down to the base. Apply the spray from two or three sides, and it is safe to say the result will be satisfactory in cleansing the tree from parasitic growth and rubbish generally.

In some districts there is none of this roughness, but the trees and fruit are chiefly affected with spot or scab. It must then be decided whether such trees should be cut back and reworked as above described or sprayed with a fungicide. Regarding the latter alternative, authorities still award the palm to Bordeaux as a fungicide for this purpose, but one often hears on the farm of the difficulty of getting suitable lime. When this occurs washing-soda may be used in the place of lime with good results. During the dormant season 1¼ lb. of soda should be used to 1 lb. of the lime that it replaces; or a plain solution of bluestone may be applied, as recommended by Mr. A. B. Mansfield, Orchard Instructor of the Auckland District—1 lb. of bluestone being dissolved in 10 gallons of water. This spray has been used in many districts as a most useful fungicide for winter application, its simplicity commending it to many.

Other orchards, again, are chiefly troubled with scab, aphis, and red spider, represented in winter mostly by egg-clusters under the shelter of the mother scale, or unprotected clusters of scarlet eggs in angles and depressions of the surface of the wood. These parasites are got rid of by spraying with a petroleum-oil—more familiarly known as "red oil"—on the principle that if you grease an egg it will not hatch. This spray also penetrates the woolly coating of the aphis that sheds water in such a ready manner. But it is first necessary to dilute the oil with water. The difficulty is proverbial, and first attempts are often ineffectual; the oil persists in floating, and the tree gets too much oil in some places and only water in most. This, of course, misses the main point, and in addition is damaging to the tree. For the farm orchard it is advisable to obtain a red oil that has received some preparation. Firms who make these up usually give them a registered name under which they are sold. There are two or three good compositions of the kind on the market; generally they have to be merely poured into cold water and stirred, and the mixture is ready for application. As advised in the orchard notes in the June number of the *Journal*, one part of prepared oil should be added to twelve parts of water.

Now, it is not advised that the farm orchard should receive all these sprays in one season. Ascertain the greatest need, and select the spray accordingly. Mix it with care, apply it thoroughly as described, and if the trees are badly affected give two applications during the winter, early and late for preference.

Only one other pest need be mentioned here, the codlin-moth, whose attacks can only be met satisfactorily with summer sprayings of arsenate of lead. Give special attention to those varieties of fruit that experience indicates as being most liable to attack, and make the first application a thorough one, for it is said the first lead spray of the season does 80 per cent. of the work—and experience just about endorses the statement—when the application is administered at the right time.

THE SWAMP-POTATO (SOLANUM COMMERSONII).

JOSHUA BEVERLEY.

AT the International Conference on Hybridization and Cross-breeding, held in London in 1906, it was considered sufficiently important to bring the Swamp-potato forward for discussion, because M. Labergerie, of Verrières, France, had secured a blue or violet-coloured sport from it. This form was introduced into commerce under the name *Solanum Commersonii* variety Violet. There were people in France, notably M. Philippe de Vilmorin, who doubted if this blue variety was actually produced from *S. Commersonii*, as in all its characters it closely resembled a variety of the common potato called Blaue Riesen, or Blue Giant, raised by Herr Paulsen, of Nassengrund, Bavaria. These two varieties, *S. Commersonii* variety Violet and Blue Giant, have been grown and tested at the Moumahaki Experimental Farm; therefore some information regarding them may be of interest.

M. Labergerie got his tubers of the Swamp-potato from Professor Heckl, of the Botanical Gardens, Marseilles, and cultivated them on highly fertilized soil. In the first year a strange thing happened. On lifting them he found a violet-coloured potato under one plant, and after propagating it he found it produced large tubers in great abundance. M. Labergerie was known to be a man who worked with great care, and his honesty was undoubted. It was thought that, notwithstanding precautions, an error had been made, and that a tuber of Blue Giant must have been in the soil at the place where he planted the Swamp-potato.

During the summer of 1906 Messrs. Sutton and Sons, Reading, grew all three varieties in their trial grounds, and a party of

potato experts and growers visited these grounds by invitation. No difference could be seen by any one between the Blue Giant and *S. Commersonii* variety Violet introduced by M. Labergerie. I had a similar experience the same year, and discarded the *S. Commersonii* variety Violet at the end of the year 1907.

Professor Wittmack, Berlin, said the Swamp-potato *S. Commersonii* was a potato of the eastern coast of South America, and was first found by Commerson in the year 1767 on the banks of the River Mercedes, near Montevideo. He also said the chief difference between *S. Commersonii* and *S. Commersonii* variety Violet lies in the calyx. The calyx-teeth are short and triangular in the Swamp-potato, whilst in the supposed sport from it the calyx-teeth are long and awl-shaped (subulate). This character is one which never changes in our common potato.

I grew the Swamp-potato *S. Commersonii* for five years, and saw no sign of it having arrived at a state of mutation during the time it was under observation. I found this potato a low-growing one with remarkably long stolons often more than a yard long. The tubers are very small and irregular-shaped, and a pale yellow in colour, with many lenticels, and very bitter in taste. The plum or apple is heart-shaped and seedless. As a parent plant (the male) in potato crosses its usefulness is doubtful; I got very undesirable seedlings by using it for that purpose.

For ornamental purposes in a garden the Swamp-potato *S. Commersonii* is attractive. The flowers are white, of a very agreeable odour, like sweet-peas; the corolla reflexes on opening in the morning, and at noon it closes until the following morning, when it opens again.

In conclusion, although some doubt still exists as to the origin of *S. Commersonii* variety Violet, it is undoubtedly true that sports are obtained occasionally by those whose business leads them to look out for such things.

Mr. John Brown, B.Sc.(Agr.), N.D.A., newly appointed Director of the Fields Division, took up his duties on the 1st July. Mr. Brown holds his degree in agricultural science from the University of Glasgow, and his National Diploma in Agriculture is that of Great Britain. For some time Mr. Brown held an appointment under the South Canterbury Education Board, and latterly he has occupied the position of principal of the Queensland Agricultural College, Gatton.

WHEAT-GROWING AT WERAROA.

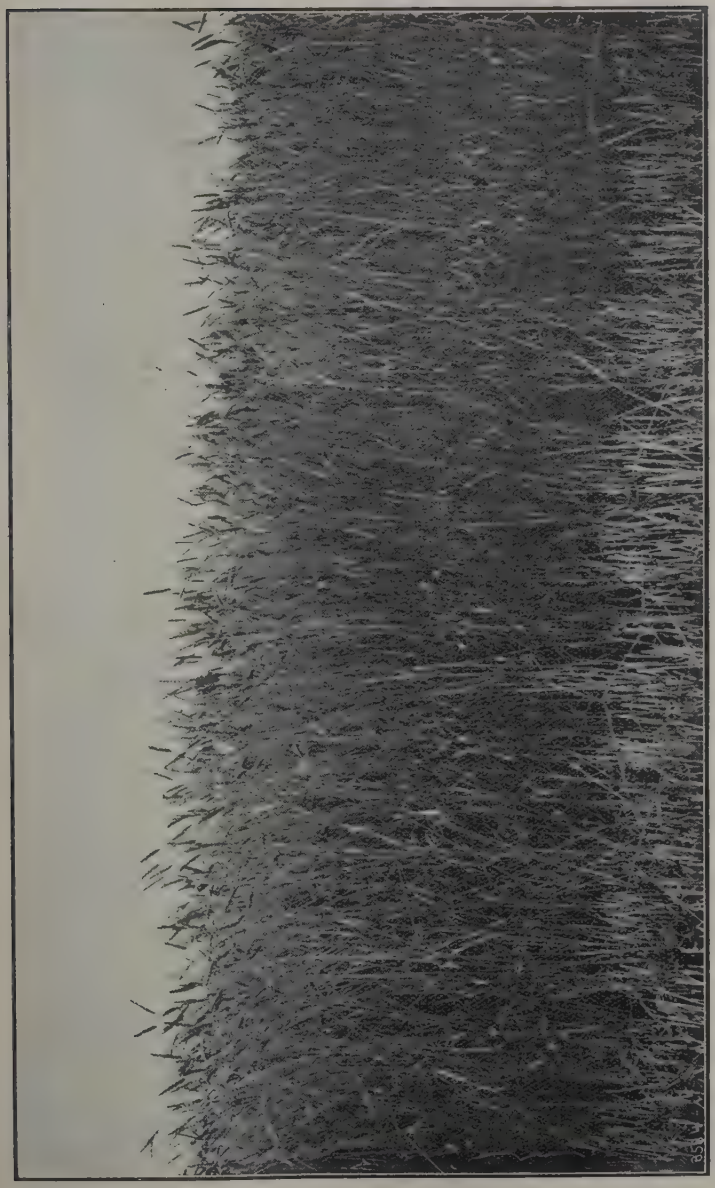
J. DRYSDALE.

WITH the approach of the spring-wheat sowing season, and in view of the desire of many farmers outside the recognized grain-growing districts to help in the production of ample stocks of milling-wheat to meet war conditions, last season's experience of the Weraroa Experimental Farm in wheat-growing affords a useful guide as to what can be accomplished in that direction.

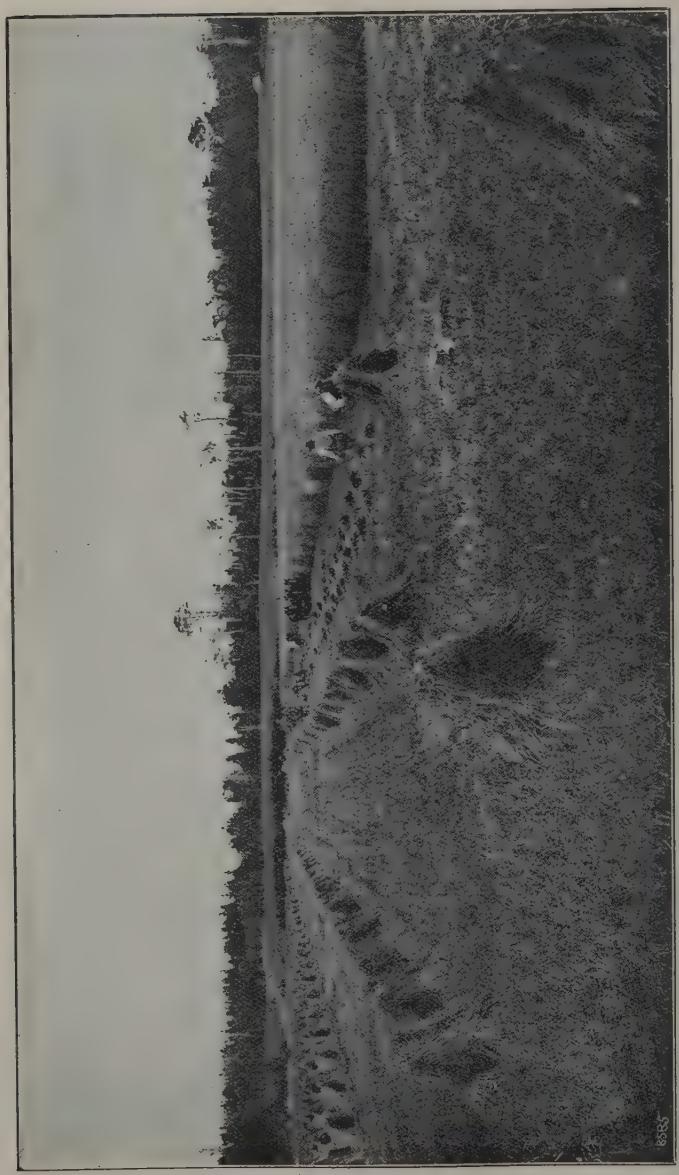
The Weraroa wheat crop was grown mainly on account of the Prime Minister's appeal of August last to the farmers of the Dominion for the growing of as much cereal produce as possible. It was felt that the State through its agricultural establishments should practise what it preached, and furnish any necessary demonstrations for extended action in the future. At Weraroa the demonstration consisted in showing that wheat can be successfully grown without any special preparation or manure in districts such as Horowhenua, which are classed in general as dairying-country.

The decision to grow wheat on the farm on anything like an extended scale was not arrived at until the beginning of September. An aggregate of close on 20 acres was grown, but the present account deals specially with an area of 9 acres. This field had been in temporary pasture, and was ploughed on the 3rd September, 1914. The wheat-seed was sown on the 7th September, the variety being Purple-straw Tuscan. No manure was used. The crop was cut on the 8th February, 1915, having thus taken 154 days to mature. On threshing the yield turned out at 50 bushels to the acre. The grain was a fine plump sample, and was pronounced by a competent miller to be of excellent quality. The bulk of the crop was reserved for seed purposes, and as such is realizing 8s. per bushel.

It is interesting to note as a sequel in the related farm operations that the stubble of the 9-acre wheatfield was ploughed and sown with barley and tares in the middle of March. This crop came away well, and stock was put on to graze it on the 18th May. Thus the time occupied to prepare the land for wheat, grow and harvest the wheat crop, and get the land into temporary pasture again was eight months and a half. It may be mentioned that



WHEAT-GROWING AT WERAROA.—THE CROP OF PURPLE-STRAW TUSCAN.



WHEAT-GROWING AT WERAROA.—HARVESTING THE CROP.

the ground cropped is a medium loam; the land is flat, and was originally in heavy bush.

A considerable area, about 30 acres, is to be sown in wheat at the Weraroa Farm in the coming spring. From this it should not be inferred that wheat-growing is to be made a regular feature of this farm's operations. It is recognized that the expense in connection with wheat-growing, coupled with the very high value of land of the Weraroa Farm type, also the conditions generally as compared with those of the regular wheat-growing districts, discount the growing of wheat on a commercial scale during normal times. The crop will be grown mainly to again demonstrate that in times of possible scarcity and of high prices like the present, land that may be considered unsuitable for wheat-growing under normal conditions can be profitably employed for such a purpose.

ROLL OF HONOUR.

CASUALTIES among the New Zealand Forces at the seat of war include two members of the Department of Agriculture, Industries, and Commerce, who were killed in action early in the Dardanelles operations.

Lieutenant Percy T. Emerson, Wellington Mounted Rifles, had been in the service of the Live-stock and Meat Division for nine years. The present war was not his first experience of active soldiering. He did good service in South Africa, where he obtained a commission in the field.

Lieutenant W. E. F. Flower, 6th Hauraki Rifles, had been connected with the Fields Division for about four years, and latterly held the position of Fields Inspector at Thames.

The news of the death of these officers was received with very great regret by their fellow-members of the Department, who also extend their sympathy to the bereaved families.

A green-manuring experiment conducted in the nursery section of the Ruakura Farm of Instruction during the past autumn gave a very marked result as regards yield of material. On the 26th March two plots of equal size were sown, one with Emerald ryecorn and broad beans and the other with Black Hulless barley and horse-beans. Neither plot received any artificial manure. The latter crop threw more than twice the bulk of green stuff of the former, and was ready for digging under at the end of May.

HONEY AS A FOOD.

B. C. ASTON, F.I.C.

[Paper read before the Beekeepers' Conference recently held in Wellington.]

HONEY is one of the oldest of foods. When the hairy savage of the Stone Age licked his sticky fingers after robbing a nest of bees his delight must have been equalled only by that of the occasion when he tasted a pot of the precious syrup diluted, perhaps accidentally, by the rain, and fermented—his first alcoholic drink, mead.

A love of sweet-tasting things is usually natural to healthy muscular persons whose dietary and habits are normal. The Eastern races delight in sweetmeats and sweet drinks. The traveller crossing the desert is quite contented if he can get a handful of sweet dried fruit, figs, or dates for his daily bread. The manna showered on the Israelites in their wanderings in the wilderness was another form of sugar eagerly welcomed by the tired and hungry travellers.* One of the first riddles, with a strong Oriental flavour, is about honey: "Out of the eater came forth meat, and out of the strong came forth sweetness." It was indeed from the East that sugar was first introduced to Western civilization. Cane-sugar was probably known in China two thousand years before its introduction into Europe. The Greeks spoke of sugar as "Indian salt," or as "honey made from reeds."

Ignorance of sugar and its origin continued in Europe down to the Middle Ages, before which it was confounded with manna or a gummy exudation from a plant. From India the sugar-cane spread westward to North Africa and the Canary Islands, and later to the West Indies and Brazil. In Good Queen Bess's golden days it was a new food, and, like many innovations in diet, was often used to excess—a thing we seldom hear of in these days of tobacco, chewing-gum, and the continuous use of alcoholic drinks. In those days the excessive use of sugar among the English, and their black teeth said to be caused by it, were remarked by travellers.

* The illustration shows New Zealand manna on the manuka (*Leptospermum scoparium*). Little is known about this substance, and the author would be glad of a supply, however small, for research purposes.

The price of sugar in 1613 was 1s. 9½d. per pound; before the present war it was sold in some shops in England, when other goods were purchased, at as low a price as 1d. per pound. Sugar has now, therefore, an assured place in the dietary of nations, but it is eaten in moderation, well diluted by other foods and drinks.

New-Zealanders eat more sugar than most other British people. I am not sure that they do not top the list in the quantity consumed per head annually. This is as it should be, for in New Zealand we have a race which performs a very high average amount of physical work involving the use of muscle, and sugar is *par excellence* a muscle-food. Carbohydrates are the chief source of muscular energy, and sugars, which belong to this class of foodstuffs (containing carbon, hydrogen, and oxygen — hence the name "carbo-hydrates"), are mostly soluble in water; whereas other carbo-hydrates, such as starches and fats, are insoluble and have to be made soluble by the body fluids before they can be assimilated. Hence sugar is immediately dissolved in coming into contact with water, and is digested much more quickly than are the other carbo-hydrates.

NEW ZEALAND MANNA ON MANUKA.

On account of the ease with which they are absorbed, sugars are calculated to enable the organism to resist the effects of fatigue better than any other food, and are specially valuable in increasing the capacity of persons required to do work in a more or less exhausted condition. Any one who has ever endured fatiguing marches will testify to the great sustain-

ing-power of sugars, whether in the pure form slowly dissolved in the mouth, as dried fruits, or as confections such as chocolate, and how much he would prefer this form of carbohydrate for quickly replenishing his strength to that of starchy or fatty foods.

Again, although butter will ultimately yield about twice as much energy as a similar weight of sugar, it is at four times the cost. Sugar is perhaps the cheapest of foods; it is certainly the purest. Its very purity and solubility are sometimes disadvantageous. It is so pure that there is no ash left on burning it at a red heat until all the carbon is consumed, and it is this very ash in such substances as vegetables, meat, or bread which enables us to build up our bone-structure and to renew the waste of it from time to time, and which supplies the iron, sodium, and other salts so necessary to the formation of our blood-supply and the consequent nourishment of the tissues through which it circulates. In this connection honey has a decided advantage over cane or beet sugar, which only contains the merest trace of ash, while honey contains from 0·1 per cent. to 0·26 per cent. of mineral matter.

For every 100 calories of edible food material there are the following mineral matters, stated in grams:—

Table I.

—	Lime (CaO).	Magnesia (MgO).	Potash (K_2O).	Soda (Na_2O).	Phosphoric Acid (P_2O_5).	Chlorine (Cl).	Iron (Fe).	Sulphur (S).
Honey	0·001	0·01	0·13	..	0·01	0·01	0·0003	..
Butter ..	0·003	0·0001	0·003	..	0·004	..	..	..
White bread ..	0·011	0·0110	0·040	..	0·075	..	0·0003	0·05
Oatmeal ..	0·030	0·052	0·113	0·027	0·216	0·009	0·0009	0·053
Sugar (mere traces of everything).								

It will be seen from this that honey compares favourably with other pure carbohydrate foods, such as butter and sugar, in mineral-content, or even with the "staff of life" itself in iron-content.

Another disadvantage in the extreme solubility of sugars is that a few injudicious people, and most children if unchecked, are apt to take too much concentrated sugar at one time into the stomach without sufficiently diluting it with other food or saliva, in which case sugar is apt to produce gastric disturbance, indigestion, &c. It must be remembered that sugar in concentrated solutions is a preservative as well as a food. It is, of course, a fact well known to brewers that a strong solution of sugar cannot be fermented into alcohol; the yeast-plant

refuses to grow unless the solution be sufficiently diluted and kept at the right temperature, when fermentation will vigorously commence.

Most healthy people who can take sugar would, on account of the pleasant flavour, prefer honey to cane-sugar, but there are some forms of dyspepsia in which it is thought by authorities preferable to prescribe cane-sugar rather than inverted sugar; in other gastric disturbance lactose or milk-sugar is preferred. It is not at all proved that sugars are bad for the teeth, although there is a very old and widespread idea that dental caries is caused by too free an indulgence in sugar.

As to the absolute food value of honey compared with sugar and other non-starchy carbohydrates, it comes a good second to cane-sugar, which, of course, includes beet-sugar. That honey should come so near sugar in spite of the huge development of the cane- and beet-sugar industries and of the dairy industry within the last century is surprising, and is a remarkable testimony to the work of the bee. Here is a comparative table showing the food values of the three non-starchy carbohydrates most commonly used in the solid form:—

Table II.

	Price per Pound.	Fuel Value per Pound.	Weight of 1,000-calorie Portion.	Cost per 1,000-calorie Portion.
	s. d.	Calories.	Grams.	d.
Sugar	0 2½	1,815	250	1·38
Honey	0 6	1,481	310	4·10
Butter	1 7	3,491	130	5·44

A calorie is the amount of heat required to raise the temperature of 1,000 cubic centimetres of water through 1° C.

A 1,000-calorie portion is the amount of substance required to produce 1,000 calories.

It will here be seen that whereas it costs 1·38d. to produce a thousand calories with sugar, with honey it costs 4·10d., and with butter it costs 5·44d. There is therefore a considerable saving in using, where admissible, honey instead of butter to produce a given effect. It should be pointed out that although honey is now regarded as a luxury, it is only the phenomenally low price and high purity of cane-sugar which makes it so. With sugar at 1s. 9½d. per pound, as in Elizabeth's reign, honey would be in the first place. With butter at 1s. 7d. per pound honey is superior in value as a food.

In addition to the food constitutents dextrose and lævulose (two sugars which result when cane-sugar is acted upon by acids —a process called "inversion," and the product "inverted sugar"),

honey contains certain flavours and aromas, as well as small quantities of acids and certain other bodies of subtle composition derived from the bee and flowers which defy the ordinary analyst to determine in the course of a commercial analysis. It is therefore no easy matter to produce a factitious honey which shall please the palate like the genuine substance. It is, however, a very easy matter to produce from cheap materials an artificial honey which shall give the same general analytical figures. Hence honey is one of the most frequently imitated foods, owing to the low cost of the sugars (one of which may be made from sawdust) employed. The manufacture of artificial honey has, indeed, become a fine art in America, where pollen and dead bees are skilfully added to give verisimilitude to an otherwise bald and unconvincing article.

The water-content of New Zealand honey seems to be lower on the average than that of any other country. If this should be proved, New Zealand honey should, other things being equal, have a proportionately greater food value. Last year the Director of the Orchards, Gardens, and Apiaries Division, Mr. T. W. Kirk, obtained a number of samples of known genuine honey from various localities in New Zealand. About twelve samples were taken from each of the following districts, with the result that on analysis the samples showed the percentages of water which are stated below:—

	Per Cent. Water.
Auckland	.. 17·19
Wellington and Taranaki	.. 15·71
Canterbury, Nelson, and Marlborough ..	.. 16·14
Otago and Southland	.. 16·33

In 100 samples of known pure honey analysed by the United States Department of Agriculture the average was 17·59 per cent., with a range of 12·42 per cent. to 26·88 per cent.

In 138 samples of pure honey analysed by König the average was 20·6 per cent., and in nineteen samples analysed by Lehmann and Stadlinger the water-content was 19·3 per cent. These last were apparently German samples.

The New Zealand samples, therefore, had a lower average moisture-content than any of the others. I think that further investigation should be made regarding New Zealand honey, and if it is found to be consistently drier than these samples of the Northern Hemisphere, the standard of 26 per cent. of water allowed to be present by the New Zealand Sale of Food and Drugs Act, 1908, might with advantage to the industry be reduced.

LUCERNE AND WEEDS.

A. H. COCKAYNE.*

A VERY large percentage of the failures that occur in the attempt to establish lucerne is due to an excessive development of weeds taking place within a few months of the sowing of the crop. Owing to the comparatively slow growth of lucerne during the seedling stage, weeds soon smother the young plants. The result is that within a month or two of sowing the chance of a successful take of lucerne appears extremely remote, and the farmer in disgust ploughs up the land and devotes it to some other crop. In view of the weed difficulty in the establishment of lucerne, special stress is always laid on the fact that clean land is one of the essentials of success. Thus it is generally stated that cropping with a cleaning-crop such as roots is the best preparation that can be given to land intended for lucerne. For my part, I am by no means sure that this is the best procedure on all classes of land, as I have found that on the average the weed-seed content of lea land is less than that of cultivated land. It is, however, an undoubted fact that the growing of a cleaning-crop does not in many cases sufficiently rid the ground of weed-seeds as to eliminate the problem so far as lucerne-establishment is concerned. It appears as if on certain soils that have been under occupation for many years, no matter how carefully the land is worked up, a great growth of weeds rapidly appears soon after the lucerne is sown. The accurate determining of what is the most practical process to adopt in order to minimize the effects of these weeds is thus one of the most important problems in lucerne-growing.

During the summer of 1913–14 it was decided to lay down a 14-acre paddock with lucerne at the Weraroa Experimental Farm. The history of this operation affords an exceedingly instructive case of the difficulties of lucerne-establishment on land apparently naturally prone to weed-development. The paddock selected had been ploughed out of grass in February, 1911. The pasture was a temporary one, having been laid down about four years, and consisted mainly of rye-grass. There was also present

* I have to thank Mr. Drysdale, Manager of the Weraroa Experimental Farm, for much of the material from which this note was prepared.—*A. H. C.*

GENERAL VIEW OF LUCERNE-FIELD SEVEN WEEKS AFTER SOWING. ALMOST THE WHOLE OF THE GROWTH CONSISTS OF WEEDS.

SHEPHERD'S PURSE (CAPSELLA BURSA-PASTORIS) IN FIELD SEVEN WEEKS AFTER SOWING LUCERNE.

a considerable amount of *Poa nemoralis*, a seed included in the original sowing after the falling of the bush. After ploughing, the land was sown with barley and tares. This fodder crop was fed off with sheep from April to July. After the second growth had come away the crop was ploughed under, and in October the land was thoroughly cultivated and prepared for roots, one half of the field being devoted to turnips and the other half to mangels. Both crops were excellent ones, and were fed off by sheep. The remains of the crop were ploughed under in September, 1912, and the area was then sown with various varieties of roots, silver-beet, and kale for experimental feeding purposes. In October, 1913, the land was carefully prepared for lucerne, but, owing to unfavourable weather, seeding did not take place till the 8th January, 1914. During these three months the land was kept constantly cultivated, and by January the soil was in perfect condition and apparently free from weeds. The ground was rolled with a Cambridge roller before sowing. 18 lb. of seed mixed with 2 cwt. of basic slag was sown per acre through the manure-box of a broadcast drill. The land was then chain-harrowed and rolled

Within two weeks the seed had brairded excellently, and there was every indication that the lucerne would become rapidly established. However, weeds made their appearance in the second week after sowing, and four weeks later the whole field consisted of a mass of weeds completely overtopping the lucerne. The main weeds consisted of fat-hen, shepherd's purse, spurry, and chickweed. These were so thick that it was almost incredible to think that they had not been purposely sown. I made a rough calculation of the numbers, and came to the conclusion that at least 40 lb. of weed-seeds per acre had germinated. To all appearances the lucerne was doomed to be completely smothered out, and nine out of every ten farmers would have immediately ploughed up the field. Instead of this being done, however, the mower was run over the field, and this process was repeated whenever a fresh development of weeds threatened to smother out the lucerne. At the commencement of July, 1914, the field was cultivated with a spring-tooth cultivator. In August the ground was tine-harrowed, making the surface smooth. Two weeks later the spring growth of lucerne made its appearance.

From October to the end of May an average of 300 sheep per acre were grazed periodically on the field. The method adopted was to graze for twelve days and then rest the lucerne for eight days before grazing down again. During this period of eight months the field was grazed 147 days, and carried an average of twenty-one sheep per acre.

FAT-HEN (CHENOPODIUM ALBUM) IN FIELD SEVEN WEEKS AFTER SOWING LUCERNE.

SPURRY (SPERGULA ARVENSIS) IN FIELD SEVEN WEEKS AFTER SOWING LUCERNE.

Photos by E. Bruce Levy.

This experience at Weraroa is extremely significant. It must be noted that every possible effort was made to provide a clean seed-bed. The inability to secure this condition seems to indicate that on certain land the weed-content of the soil is so great that it is impossible to clean the ground by mere cultivation extending over only one or two seasons. If such is the case it is obvious that, unless some method of dealing with the weeds after the lucerne is sown can be employed, soils containing a high weed-seed content cannot be utilized for lucerne-growing. It has certainly been advocated that on land where the weed factor seems to be the determining one in successful establishment lucerne should be drilled in rows sufficiently wide apart to allow of intercultivation. For my part, however, I am much averse to the idea of drilling lucerne in rows at all, the proper development of the rooting-system of the plant being greatly retarded by the crowding of the plants in rows.

The system adopted at Weraroa of keeping the crop well mowed down whenever weeds appear to be gaining the upper hand has certainly given excellent results. There seems little doubt that its employment in many cases where weeds have smothered out the young plants would have led to the successful establishment of lucerne.

PERENNIAL CANARY-GRASS (PHALARIS BULBOSA).

R. McGILLIVRAY.

PERENNIAL canary-grass (*Phalaris bulbosa*) is a grass which is receiving considerable attention in some localities, but in most places is known by name only. It has been called the king of winter grasses, and the name is very appropriate, as, in addition to the ordinary summer growth, it will continue to grow right through the winter months, and seems to quite enjoy hard frosts. It produces very heavy crops, and makes nutritious hay which is much relished by stock. In some cases the hay has turned out hard and dry, but this was because it was not cut at the proper time. As indicated by its popular name, *Phalaris bulbosa* is a permanent grass. The crowns of the plant are down below the surface of the ground, and are not affected by cutting or close grazing. It grows rapidly after being closely eaten down

or cut, and sends up a soft and succulent growth, not unlike oats, and at this stage stock of all kinds are exceptionally fond of it.

An interesting experiment was carried out at Mr. D. Stewart's farm, near Owaka, for the purpose of testing *Phalaris bulbosa* on light sandy soil, which in dry windy weather is very liable to drift. The land was cultivated, and the seed sown broadcast and harrowed in on the 4th December, 1914. The grass in twenty-one days had completely covered the ground, and had made remarkable growth, although the weather was windy and, generally speaking, unfavourable to growth. For the purpose of ascertaining to what height it would grow and to see its seeding-qualities on sandy soil, it was allowed to run to seed, and was cut and tied in sheaves on the 29th March, 1915. The heads were well developed, and some of them were ripe. The average height of the crop was 4 ft., and although it was allowed to mature the stalks were not to any extent hard or wiry, but, on the contrary, were sweet and juicy, and were eaten readily by young cattle. The root-growth was vigorous, and the plot now shows a strong second growth.

NOTE BY THE BIOLOGIST.

PERENNIAL canary-grass has been grown on quite an extensive scale in the Makerua Swamp district. Mr. D. Craw, of Linton, has an area of over 50 acres consisting entirely of this grass. Although grown primarily for seed-production, it furnishes excellent grazing during the period when not shut up. In the Cambridge district, Waikato, several farmers grow perennial canary-grass for seed purposes. The majority of the seed raised in New Zealand is exported to South Africa. It is peculiar that more attention has not been given to the growing of this grass for fodder, hay, or pasture purposes, and it is probable that the high price of the seed has been the main factor in restricting its application as a farm crop. As a winter grass it is perhaps superior to prairie-grass, and it possesses the added advantage of withstanding heavy stocking.—*A. H. Cockayne.*

At the Arataki Experimental Farm, Hastings, the vines grafted this season have lifted well. They have proved to be very good plants, thus demonstrating the fact that vines like dry weather, for they were not watered throughout the long dry period experienced in Hawke's Bay.

PLOUGHING MATCH AT WERAROA.

A PLOUGHING match for the learners at the Weraroa Experimental Farm was organized by the Manager of that station, and took place on the 11th June. The public were invited to be present, and the interested observers included a number of lads from neighbouring schools, &c. The event thus partook of the nature of a rally for the new tillage campaign in the Dominion which has arisen out of the war conditions.

The land selected for the match was a grass lea which it is intended to sow in spring wheat, and the ground turned up in good condition. Five learners competed; double-furrow ploughs and three-horse teams were used, the latter all provided from the farm stables. Each competitor had to plough close on an acre. The lads handled their teams capably, and performed very creditable work, showing excellent training in this respect.

The following awards were made by the judges, Messrs. E. Law, of Shannon, and J. Drysdale, Manager of the farm:—

Best-ploughed lot: W. W. Thompson 1, Harry Pryor 2, William Dale 3, James Tolley 4, J. M. Smith 5.

Best "ins and outs": W. W. Thompson 1, Harry Pryor 2, J. M. Smith 3, J. Tolley 4, W. Dale 5.

Straightest-ploughed lot: W. W. Thompson 1, W. Dale 2, Harry Pryor 3, J. M. Smith 4, J. Tolley 5.

W. W. Thompson, placed first all-round, is fifteen years of age, and had been on the farm less than six months at the time of the match. None of the competitors are over seventeen years.

In the course of some remarks at the close Mr. Law expressed the opinion that the farmers of the district should hold annual ploughing matches. It may be hoped that the junior event instituted at Weraroa will stimulate senior efforts in the Manawatu district, where ploughing competitions have been hitherto practically unknown.

JURORS EXAMINING NEW ZEALAND PRODUCE AT PANAMA PACIFIC EXHIBITION.

WORK FOR THE COMING MONTH.

NEW ZEALAND is a country of wide variation in climatic and soil conditions. In applying suggested procedure it is, therefore, necessary for the farmer to amend it to suit local weather-conditions and the requirements of his soil—information which can best be ascertained by a study of these problems on the part of the farmer himself. Nothing can take the place of local knowledge. Little advice on an agricultural subject is capable of general application in its entirety.

THE ORCHARD.

J. A. CAMPBELL.

PRACTICALLY the first indications of approaching spring are noticeable in the orchard during the month of August in the swelling and bursting of the buds of such trees as the peach, nectarine, and Japanese plum. Before the end of the month many of the early flowering varieties of these trees will be in full bloom. These indications should be taken as a warning that the dormant season is rapidly drawing to a close, and the completion of all work necessary before this takes place should be pushed forward as rapidly as possible. It must also be remembered that the weather during the month is far from reliable, so that advantage should be taken of every opportunity offered. The work that most growers will still have to consider will include the completion of pruning, spraying, planting, cultivation, manuring, selection of scions for grafting, &c. Although a certain proportion of this work can be completed in September, the major portion can be more satisfactorily attended to during this month.

SPRAYING.

The necessity for thoroughly carrying out the winter spraying of fruit-trees has been many times previously emphasized in the monthly notes, and is recognized by all experienced fruitgrowers; but as these remarks are intended chiefly for the benefit of the more or less inexperienced grower something further on the matter may not be out of place.

Carefully select and mix the ingredients required to be used, the advice on which should be derived from a reliable source. This is an important point, as there are very few subjects on which

advice is so readily available as orcharding generally, much of which, needless to say, the person concerned would be infinitely better without.

If possible, select a calm fine day for spraying. If the spray is applied to the tree when wet, the strength is reduced according to the amount of water on the tree. Thoroughly cover all parts of the tree, paying particular attention to the tips of the branches, otherwise small colonies of the insect will escape and be free to set up infection later. Apply the mixture at a pressure of 100 lb. to 150 lb. to the square inch in order to force the mixture well into the crevices and cracks in the bark where the insects and insect-eggs are generally secreted.

In the majority of cases, no doubt, the principal winter spraying will have already been done, but where such is not the case the following diseases should be attended to and remedies applied as early as possible:—

Peach and Nectarine.—For the control of red mite and San Jose scale, early varieties should be sprayed with oil 1–20, and other varieties 1–17. Lime-sulphur may be used 1–15 to control San Jose scale in all varieties.

Other Stone-fruits.—Oil 1–17 should be used for the control of red mite, mussel scale, and San Jose scale. Lime-sulphur 1–15 may be used in the case of San Jose scale with equal effect. Practically the whole of the Japanese varieties of plums are liable to the attacks of the disease known as plum-pocket or bladder-plum, and, as several of them blossom early, they should be sprayed with the winter formula of the Bordeaux mixture just as the buds begin to swell.

Pip-fruits.—Mealy bug, red mite, mussel scale, and woolly aphis should be controlled with oil 1–15. If the trees are badly affected with mussel scale, oil 1–12 should be used. San Jose scale requires the application of oil 1–15 or lime-sulphur 1–12.

LEAF-CURL.

The puckered and distorted appearance of the foliage of the peach and nectarine, from which the name arises, noticeable in the early spring, is caused by a parasitic fungus known as *Exoascus deformans*, and not by cold winds as many erroneously believe. The foliage of a diseased tree eventually falls, and new leaves are pushed out to replace them. These usually remain more or less free from affection, causing in many cases the false impression that the tree has thrown off the disease. When the leaves of any plant become affected by disease or other injury and are

no longer able to perform their proper functions the result is disastrous to the plant. This is what takes place with a tree affected with leaf-curl. The strain on the vitality of the tree caused by defoliation and in the production of new foliage in order to keep alive is constantly weakening the tree, resulting, in bad cases, in the total loss of crop also. Some varieties of peach and nectarine trees are less subject to attack than others, but under climatic conditions favourable to fungus diseases few of either are altogether immune.

Although the total eradication of this disease is out of the question, it is comparatively easy to control by spraying. This, however, must be carried out every season, otherwise attacks more or less violent are sure to take place. Nothing can be done for this disease after the foliage becomes affected. The treatment to be effective must be carried out prior to the bursting of the buds. Some people are under the impression that oil emulsion is intended for this purpose. This is not so; the spray required must be fungicide, preferably Bordeaux mixture (winter formula) or lime-sulphur 1-15. Apply just as the buds begin to swell.

CITRUS FRUITS.

The lemon is very commonly affected with the fungus disease known as "verrucosis." This disease causes unsightly blemishes to appear on the fruit, considerably lessening its market value.

As soon as the main crop of fruit is gathered spray thoroughly with 4-5-50 Bordeaux mixture. Black, red, and other scale insects affecting citrus trees are the real cause of the "smutty leaf" which often causes the grower much concern, whilst the sucking-insect, the real cause of the trouble, is entirely overlooked. Remove the scale and the smutty leaf will also disappear. For this purpose spray prior to the first spring growth with emulsified oil at the rate of 1-20 to 1-25.

PLANTING.

August is a very popular month in many districts for planting out fruit-trees, weather and soil conditions usually being favourable; but it must be remembered that these conditions do not always obtain. The weather at this season of the year being rather unreliable, the work of planting should be pushed on whenever circumstances permit.

Many varieties of stone-fruits will soon be bursting into bloom, therefore, should anything take place to hinder planting operations, this class of fruit should receive first consideration. The planting

of pip-fruits can with more safety be deferred till next month. Young fruit-trees often come to hand with more or less bruised and broken roots. These, together with all crossed and twisted roots, should be carefully cut away before planting.

Young trees before being planted should be dipped as directed in the May issue of the *Journal*.

PRUNING.

This very important feature of fruit-culture should on no account be neglected. Much of this work will have been done before this, but where such is not the case it should be undertaken straight away. Young trees particularly require attention. Many orchard-trees have failed to reach the highest value mainly owing to this work being neglected in their earlier stages.

CULTIVATION.

The practice of ploughing the orchard in the late autumn adopted by the most practical growers lessens the necessity for further cultivation during this month. But where autumn ploughing has not been attended to early spring ploughing becomes an urgent necessity, in order that such growth as weeds and late-sown cover-crops may have sufficient time to thoroughly rot to allow of cross-ploughing being done before the hot and dry weather sets in. There are many instances in the past where ploughing delayed through one cause or another till late in the summer has resulted in considerable damage to the orchard.

GRAFTING.

The practice of converting unsuitable varieties, particularly of apples and pears, into more suitable varieties by means of cutting the trees back and grafting them with the wood of some more favoured kind is being carried on fairly extensively, particularly of late years. It has been found that commercially it is more profitable and altogether more satisfactory to confine the number of varieties of these fruits to a few of each of the best sorts. The process of grafting is very simple, and if carried out at the right season of the year can scarcely fail.

Any grower contemplating the reworking of his trees should select the scions he intends to use before the buds begin to move. These should consist of good hardy wood of last season's growth and of the variety desired. These should be placed in a cool, dark place, sheltered from the wind, preferably in a box of damp

sand in a shed. This is necessary to conserve the dormant sap stored up in the scion, on which the young leaves can draw whilst the union between it and the stock is taking place. If the scion wood is not carefully protected up till grafting-time it will be apt to become dry and shrivelled, in which state it is of little use. On the other hand, if the scions are selected at the time of grafting it will be found that the young leaves have already drawn more or less on reserve sap, which is therefore apt to become exhausted before the union with the stock takes place.

I intend continuing these remarks later, covering the actual work of grafting when the time arrives for such work to be done.

THE POULTRY-YARD.

F. C. BROWN.

THE HATCHING-PERIOD.

AUGUST may be considered the best period of the year for the hatching of the heavier breeds, and no time should be lost in placing the eggs in the incubators or nests. Where there is not sufficient incubator and brooder capacity to bring out all the chickens of the lighter breeds in September or early in October, the hatching of these should also be commenced in August. It is well to reiterate that it is more profitable to have the stock hatched on the early rather than on the late side. Late-hatched stock are unprofitable, for the reason that the needful robustness is seldom or never secured, which means that with these birds the culling must be unduly high after the first laying season. Another drawback to late-hatched stock is that they are more subject to adverse weather-conditions and disease than the bird bred at the right time.

Great care should be exercised in selecting eggs for hatching purposes. Only those of good marketable size that are produced from the best layers possessing a strong constitution should be used. If strong healthy chicks are to be produced, the breeding-birds must be fed and managed in a proper manner. A strong healthy chicken cannot be secured from a bird that is poorly fed or kept in dirty or vermin-infested quarters. Of course, while the diet should be liberal it should be plain. On no account should high records be looked for in the breeding-pen. Meat and

its substitutes should be fed sparingly. Too often we hear of incubating and brooding troubles which could all be put down to the oversupplying of forcing-food. A frequent cause of poor fertility is due to the male bird being too attentive to the hens in allowing them to have all the food, with the result that he becomes in low condition. In such cases a wise policy is to feed him by himself, or, better still, have two males and give them a week's rest alternately. It should be unnecessary to emphasize that breeding-birds should have as much range as possible, in order that they may secure the desired exercise. Where this is not possible the floor of the house should be covered with litter in which the grain food may be fed.

THE SITTING-HEN.

Probably there is no incubator on the market that will give as good results as the hen, especially where there is any weakness in the germ. In cases where the natural mothers are depended upon the difficulty of securing broodies at the right time is, however, becoming greater each year. As the egg type advances the broody propensity weakens, so that the more profitable the stock from an egg-producing viewpoint the greater the difficulty of obtaining broody hens. Where the plant is on a small scale and an incubator is not used, the question is a serious one. There are three alternatives: either to keep some inferior layers of the heavier breeds, purchase day-old chicks, or arrange to have the eggs artificially hatched by men who have the necessary plant.

CONTINUOUS HOUSING.

The principle of continuous housing, or the covered-in system where no outside runs are provided, is still on trial. That pullets may be placed in one of these commodious houses with ample scratching-accommodation and lay well is undeniable, but it has yet to be demonstrated that young stock can be taken straight from an indoor brooder to covered-in quarters and be brought to maturity in possession of the same vigour and capacity as the young stock developed under natural conditions with good range, or that the pullet so reared may be taken on to its second season under these artificial conditions without its profit-making power being affected. From a breeding viewpoint I fail to see how birds practically coddled from infancy to maturity can be regarded as desirable stock for the breeding-pen when constitution is of prime importance. The closed-in house is at its best when used only in the colder months of the year for the laying-stock.

THINGS TO REMEMBER.

Chickens hatched with a weak constitution should be killed; they are never satisfactory.

Chickens thrive best on a well-shaded grass run where fowls have not been kept for several months.

There is no best breed of fowls. It is a matter of strain that must be considered rather than breed.

Hard grains, clean water, and grit are all the food a sitting-hen requires.

Neglect in not having the wick of the incubator and brooder lamps the correct size is responsible for many failures.

The novice who is going to work an incubator this season should endeavour to get a practical lesson from a successful operator.

Avoid overfeeding young chicks for the first few days. An even temperature in the brooder-house is the chief essential for their welfare.

THE APIARY.

F. A. JACOBSEN.

NOTHING remaining to be done in handling bees at the present season, I can tender no better advice than that supplied last month. Beginners are again reminded that useful work can be done at this time of year in preparing hives, foundations, and other accessories for use during the coming summer. Those readers who have back numbers of the *Journal* available may probably find it beneficial to peruse the writer's notes in the June and July issues for the last three or four years.

AT the National Conference of Beekeepers recently held in Wellington special consideration was given to the question of qualities in connection with the official grading of honey. Beekeepers in general, it was said, had expressed a keen desire to obtain a definite knowledge of what "special," "prime," and "good" honeys really are. The writer therefore gave the Conference the following information:—

Special-grade honey is to be regarded as the finest honey this Dominion produces. The principal source from which it is gathered is clover, either pure or mixed with thistle, boxthorn, catsear, or other plants that yield a light-coloured delicately flavoured honey. The flavour, condition, and the aroma must be of high quality;

the texture or grain must be very fine. It must be free from scum, and packed in satisfactory tins and cases.

Prime-grade honey may be satisfactory in all other points excepting one, which has brought it down from the "special" grade; or it may be deficient in several necessary qualities and consequently lose one or two points in each. It must have a palatable flavour, fine aroma, and good texture, and must not fall far short of the very high standard set for "special" quality.

Good-grade honey would naturally suggest that it is a good, wholesome article, yet it has only got third place. It would probably be deficient in flavour and aroma, which is so necessary in a high-grade article that is to be used for consumption and placed on the table. The grain may be coarse and raspy to the tongue, which is a fault a number of our honeys have. In short, it is a honey that would be picked last if it were placed side by side with some of the "special" and "prime" grade. It is not necessary for any of the grades to be a special colour; they may be white, light amber, or medium amber, although the honey would be placed, in its respective class, with consideration to its colour.

THE FARM GARDEN.

W. H. TAYLOR.

VEGETABLE-CULTURE.

In all parts of the Dominion operations in the way of planting and sowing should be well in hand. The conditions of soil and climate vary so much that hard-and-fast rules applicable to all parts cannot be laid down. The procedure must vary in different parts. Thus on the rich moist flats in the Manawatu November is the best time to sow *carrots* and *parsnips* for the main crop. If sown much earlier they would most likely grow too large for table use, and, further, the later they can be sown to secure proper size the more tender they will be and the longer they will be likely to last into the following spring. Therefore, if sufficient size can be secured by sowing in November, that date would be better than an earlier one. In Hawke's Bay, however, dry summers prevail, and late-sown seed might fail to grow. Even if the seed did grow, more than the average rainfall would be required to bring the roots to a serviceable size. The seed must therefore be put in early. August is a good time in this case.

In what one may term ordinary places—that is, where there is a fair rainfall, yet not otherwise unusual advantages for quick growth —mid-September is a good time to sow carrots and parsnips as well as red beet for winter use. In the Manawatu and similar places where sunshine is experienced for many hours on moist land a rapid growth takes place, enabling a late sowing as aforesaid. Every cultivator should study local peculiarities of soil and climate.

Onions.—In many places the seed is already in the ground; where this is not so it should be got in as soon as the soil is in a fit state. The surface soil must be in a condition to admit of working it to a fine tilth. The seed cannot be successfully raised on a lumpy or a sticky bed. Sow in rows 12 in. to 15 in. apart. The drills should be very shallow and the seed scattered evenly and thinly. I always try to secure enough wood-ashes to cover the bed with a thin coat. Advantage is taken of every opportunity to secure wood-ashes after rubbish-fires have cooled down. It is important to get them under cover before rain washes the potash out. The ashes should be kept dry till they are put on the bed. Soot is also of considerable value, used in conjunction with wood-ashes. Wood-ashes have a mechanical value also, as they help to keep the soil open if it is at all stiff.

Red Beet.—There are two distinct types of red beet, the turnip-rooted and the long. The first-named is chiefly valued for early use, as it comes on quickly. It may be sown at once.

Carrots for garden purposes are of two types, the Shorthorns and Intermediate. The Shorthorns come quickly into use, and a small patch of them should be sown early.

Turnips may be sown early in August. They are almost sure to bolt to seed if sown earlier.

Peas should be sown twice a month in regular succession. In most parts the sowings are continued until January. Peas will not do well on shallow ground: the deeper it is worked the better they are likely to do; and this is particularly the case in dry and hot places, as it enables the roots to get down to cool soil.

Broad beans may now be sown. Draw a broad drill about 4 in. deep, and sow in double rows. Let each bean be about 6 in. from its fellow. When the plants are 12 in. high nip the tops off. This will cause them to sprout and quadruple the crop, besides keeping them comparatively dwarf.

Spinach may be sown as desired, also *lettuce* and *radish*.

Plant *cauliflowers* and *cabbage*, also onions from the autumn sowing. Plant crowns of summer *rhubarb*, and sow seed of the winter variety. Rhubarb requires rich ground: it is useless to attempt to grow it in poor soil

Put *asparagus* beds in order, and prepare for planting new beds. The time to plant is just as growth begins. Where the old-fashioned beds are in use, and a dressing of manure has been given, as was advised earlier, the soil that was then taken off should be returned, and a dressing of salt, 4 oz. per square yard, given. Preparations for new beds should be gone on with. The planting should be in lines on the flat, not in narrow beds or in close order. The rows should be at least 3 ft. apart, and the plants quite 30 in. apart in the rows. This is the way to get good asparagus, and plenty of it. No one would be satisfied with the old-fashioned bed stuff if he knew the difference. Where plantations of this kind already exist the manure given earlier will have largely disappeared. Give the dressing of salt as above.

Plant *shallots* and *garlic*. Choose nice friable soil, and give, if possible, a dressing of wood-ashes and soot. Press the bulbs in with the fingers so as to leave the apex just barely visible. Plant in rows far enough apart for hoeing, the sets being about 10 in. apart.

Plant early *potatoes* in friable well-drained soil, using sprouted seed. If possible surround each set with wood-ashes. They are a fine fertilizer, supplying potash, which is so necessary for potatoes, and they are also a protection against insects.

THE HEMP INDUSTRY.

W. H. FERRIS.

THE unfavourable weather has had a marked effect on hemp quality during the past month, the colour having chiefly suffered. The prevalence of heavy rains and the absence of wind has interfered with the bleaching and drying of the fibre, the result being that bleaching-fields have become blocked, and in consequence a number of mills in the Manawatu district have had to temporarily cease operations.

It is noticeable that some millers who are under contract to supply "fair" grade show unnecessary carelessness in stripping too rough a fibre, which means that only a rough low-pointed "fair" hemp is secured. Where the stripping has been fairly well done it is only necessary, if a "good-fair" grade is desired at any time, to scutch thoroughly well to obtain the desired result.

In many cases the quality of hemp which reached the grading-stores during the month would have been pointed much higher but for the unsatisfactory work in scutching. This branch of the work is invariably done under the piece-rate system, and the

tendency of the worker in general is to aim at quantity rather than quality. One result of poor scutching, and the consequent bad tail of the hanks, is that cordage-manufacturers experience great trouble in spinning, owing to the presence of knots in the tails. This fault has to be recognized in grading, and many a parcel dealt with during the past month has had in consequence to be put into a lower grade than that which the quality of the body of the fibre merited.

Generally, the stripping of the fibre in the various flax-milling districts has shown an improvement, owing not only to improved machinery, but to the better work of the men in charge.

Tow is a greatly improving product, but, unfortunately, too much rubbish is still being left in, and the proportion of first-grade is therefore low. Millers could easily effect an improvement by the exercise of more care in the shaking process.

The following tables show the quantity and quality of phormium-fibre graded in the Dominion during the second quarter of the present year and the corresponding quarter of last year:—

QUANTITY AND QUALITY OF HEMP GRADED.

Month.	Superior.	Fine.	Good-fair.	Fair.		Common.	Re-jected.	Con-demned.	Total.
				High Point.	Low Point.				
	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.
April ..	..	321	2,676	5,321	1,167	109	36	3	9,633
May ..	..	246	2,794	4,855	1,347	144	76	1	9,463
June ..	..	159	2,566	4,357	1,495	415	90	14	9,096
Totals ..	..	726	8,036	14,533	4,009	668	202	18	28,192
Percentage	..	2·6	28·5	51·55	14·22	2·37	0·72	0·06	..
Corresponding quarter of 1914	..	551	6,331	10,976	5,517	1,405	153	5	24,938
Percentage	..	2·21	25·38	44·37	22·12	5·63	0·61	0·02	..

QUANTITY AND QUALITY OF TOW GRADED.

	First Grade.	Second Grade.	Third Grade.	Con-demned.	Total.
	Bales.	Bales.	Bales.	Bales.	Bales.
Quarter ending 30th June, 1915 ..	1,750	3,954	1,910	208	7,822
Percentage	22·37	50·54	24·41	2·65	..
Quarter ending 30th June, 1914 ..	909	3,915	2,876	308	8,008
Percentage	11·35	48·83	0·36	3·84	..

ANSWERS TO CORRESPONDENTS.

CORRESPONDENTS are requested, when desiring information through the Journal in regard to disease in animals and plants, to forward, where possible, affected specimens, in order to facilitate a correct diagnosis of the trouble and to ensure the best advice. In stating a question the most complete descriptive details should be furnished.

Correspondents desiring information in regard to manurial treatment of soil are requested to fill in and forward the prescribed form—"Application for Advice as to Manurial Treatment of Soil"—obtainable from any office of the Department in the Dominion.

In every instance a question to which an answer is desired in these columns must be accompanied by the full name of the inquirer, not necessarily for publication, but as a guarantee of good faith. The question should be written only on one side of the paper.

GRASSES SUITABLE FOR SAND-DRIFTS.

"SANDHILL," Masterton :—

Could you inform me what grasses are suitable for sowing on sand-drifts, which will be covered over by rubbish, as scrub, fern, rotten straw, &c., after sowing—something that will grow quick and be more as a break than to give any feeding-value?

The Fields Division :—

The first thing to do is to arrest the initial drift by growing marram-grass and lupins. The marram, when rightly planted, regularly (from plants), in rows at right angles to the prevailing wind, and at a time when the seasonal conditions enable the plants to become established, should ultimately provide fair shelter. The plant grows fairly quickly, as does the yellow perennial lupin, planted subsequently among and to the leeward of the marram-grass. To provide quick shelter for better grasses and to confine the sand-drift the lupin is unequalled. The Department is collecting data as to the best means of dealing with sand-drift, and as to the grasses that do best after the drift is arrested. So if you write when you have dealt with the sand on the above-mentioned lines perhaps more definite information can be supplied you. When writing again, please give a full description as to the nature of the sand and drift.

FODDER CROPS.—POTATO-DISEASE.

"SUBSCRIBER," Makomako :—

1. I am just breaking up a piece of ground, and want to put a crop in to get it in order for swedes next year. Would you kindly let me know what would be the best to put in for eating off with sheep? I was thinking of putting in Garton oats and Wolths grass. Would Garton oats stand grazing off, or would barley be better? If so, what sort and what quantity should I sow?

2. Could you let me know what is the cause of skin-disease on potatoes? I have a few that have a sort of scab, and are quite rough. I used superphosphate as manure. Would that have anything to do with it? The variety is Gamekeeper.

The Fields Division :—

For eating off with sheep, I would advise you to sow Emerald rye and Black Scotch winter vetch (or the hairy vetch) at the rate of 1½ bushels of rye and

1 bushel of vetches per acre. Cape barley (2 bushels) and vetches (1 bushel) could also be sown. These grow well in winter, and both the rye and the barley provide for several feedings-off.

The disease on your potatoes is potato-scab (*Oospora scabies*). It may have been caused through previous liming (a year should elapse from the time lime is applied and when the potatoes are planted), or the spores of the disease may have been in the seed or may have been lurking in the soil. Superphosphate would not cause it; on the contrary, alkaline substances encourage it, and not acid. The treatment for potato-scab is as follows:—

On Infected Soils.—(*a.*) Adopt a rotation of crops, varying the length from three to five years. (*b.*) Plant potatoes after clover. (*c.*) Avoid alkali fertilizers. (*d.*) Avoid manure from stock fed on scabby potatoes. (*e.*) Disinfect the tubers with formalin, and plant only sound tubers. This may be done by soaking the uncut tubers for two hours in formalin solution (1 pint to 30 gallons of water). Spread the treated tubers out to dry on clean grasses, &c. Bags, &c., should be disinfected.

In the case of clean soils, plant only sound tubers and disinfect with formalin.

CLEARING PHORMIUM LAND.

"NEW SETTLER":—

Is it advisable to burn flax land after the crop has been removed, so as to destroy toitoi, raupo, &c., or should other means of clearing the rubbish off be taken?

The Fields Division:—

If the land is of a peaty nature we should not advise burning to destroy this vegetation, especially if the land has been drained and is dry. Fire would probably take a strong hold and burn the best of the substance out of the ground. If the rubbish were chipped off and placed in heaps it could then be watched and burnt, or carted off. If the ground is not of a peaty nature it could be burned off in the usual way.

SILVER-BLIGHT OF APPLE-TREES.

J. C., Umukuri:—

Can you tell me what is the preventive for silver-blight in apple-trees? I have it in Emperor Alexandra and Monroe's Favourite.

The Orchards, Gardens, and Apiaries Division:—

Silver-blight is a somewhat difficult disease to control, but applications to the soil, round the feeding-roots of the affected trees, of from 4 lb. to 6 lb. (according to size of trees) of either sulphate of ammonia or sulphate of iron has proved an effective remedy in some instances. Growers in the Stoke district, Nelson, have found that spraying affected trees when in foliage with a strong limewash (about as thick, in fact, as whitewash) is apparently effective. This method is also well worth trying.

GRAPE-VINES AND TOMATOES.

JOHN DICKSON, Christchurch:—

In my vinery this year I have grown a crop of tomatoes. The vines planted in spring are this dry season about a yard long outside. How much should I cut the rods back, and when bring them in through low back wall? Can I take another crop of tomatoes next season?

The Orchards, Gardens, and Apiaries Division:—

With regard to the vines, cut back the whole of last season's growth to the base bud. Affix a lath or other support for the purpose of training the young growth, which should be taken into the house as quickly as possible. Another crop of tomatoes can, without detriment, be taken from the house next season.

BASIC SUPERPHOSPHATE.

"SUBSCRIBER," Te Mowhai :—

What is the result of the action of superphosphate on ground limestone ?

The Chemist :—

Mixing ground limestone with superphosphate would tend to revert the superphosphate to the dicalcic phosphate form ("reverted phosphate" or "basic superphosphate").

CORNS IN HORSES' FEET.

J. J. PRINCE, Auckland :—

Could you suggest anything to cure corns in horses' feet ?

The Live-stock and Meat Division :—

The so-called "corn" is really a bruise of the membrane which secretes the horny sole, the result being the exudation of blood into the horn of the sole, which gives the corn its reddish-brown colour. The membrane is really crushed between the wing of the pedal bone inside the hoof and the heel of the shoe outside. In the majority of cases bad shoeing is the cause, although horses with flat soles and weak heels will often get them no matter how they are shod. In these cases care should be taken to see that the shoes are not kept on too long. With regard to treatment, without they are very bad and suppurating, lightly paring out the horn and removing the pressure is usually sufficient. The corn will gradually grow out. Take the horse to a good shoeing-smith and point out the trouble, and let him shoe the horse regularly.

PINUS INSIGNIS.

"INQUIRER," Myross Bush :—

Will you please inform me if the decayed and dry foliage which gathers under *Pinus insignis* and *macrocarpa* trees would be good for digging into garden soil to improve its mechanical condition and enrich it with humus ? Also, is such material as good as the leaf-mould under deciduous trees, such as hawthorns or oaks ?

The Orchards, Gardens, and Apiaries Division :—

Dry foliage from *Pinus insignis* and *macrocarpa* trees is not recommended for digging into garden soil. Leaf-mould from deciduous trees such as oaks and hawthorn is valuable, especially for pot-plants.

WOODLICE, ETC.

"AVONDALE," Avondale :—

1. Can you give me a remedy for woodlice or pig-bugs ? They are extra bad this year in my place. They are in all the vegetables, and are attacking the flowers of violets and primroses. In regard to the flowers, the bugs eat the bud right out. I have heard of a patent to kill them ("Vaporite"), but it is too expensive to use freely.

2. I have always understood that coal-ash should not be placed on garden soil : is that correct ?

The Orchards, Gardens, and Apiaries Division :—

1. Woodlice are kept under control in gardens by continual stirring of the soil. Care should be taken to see that no rubbish or rotten timber is left lying about for them to harbour in. Water near boiling-point kills them instantly, but when hot water cannot be used a teaspoonful of Condy's crystals dissolved in a gallon of cold water will kill them without injuring the plants.

2. Coal-ash is of no value as a soil-fertilizer. It could, however, be mixed with a stiff soil with the view to keeping it loose.

GOATS AND CONTAGIOUS DISEASES.

"LUCERNE," Mangere :—

Is it true that a goat kept amongst dairy cows helps to clean out contagious diseases, such as abortion?

The Live-stock and Meat Division :—

Keeping a goat amongst dairy cows does not help to clean out contagious diseases such as abortion.

CURING SKINS FOR MATS.

G. STEVENSON, Clarence Bridge :—

Could you inform me of the procedure necessary for the curing of sheep and other skins for mats, &c.?

The Live-stock and Meat Division :—

First trim all ragged edges, and remove as much flesh, fat, &c., as possible without damaging the pelt; then place the skin on the floor or other *flat* surface, and proceed to wash the wool with warm water and soap, and then with clear water; remove all surplus water from the wool by scraping or squeezing with a smooth board. Take up the skin and shake it well, and then place it fleece down on a clean surface, and take a good handful of alum, to which a *little* salt may be added, and proceed to rub it well into the pelt with a rotary motion over all the surface equally; fold up the skin, fleece outward, and let it stand for three days. Open and hang the skin for a while, and then start to scrape the skin with a furrier's knife, always scraping in the same direction; three scrapings are needed to properly finish the pelt. With different skins discretion must be used in treating strong- or weak-fibred pelts.

GATE OVER CREEK.

H. CASHMORE, Sandspit :—

I am erecting a fence, and the fence-line crosses a creek a chain wide. Would you kindly advise me through the *Journal* as to the correct way to erect a swing-gate across the creek?

The Fields Division :—

It is not stated whether the whole width of the creek contains constant running water. The best method of erecting a fence across a creek is to put in two good straining-posts on each side of the creek well on the bank, and from these stretch a ½ in. wire cable, or No. 8 plain wire twisted up to 4-ply: to this swing the gates. The space across the creek should be divided in, say, four separate gates made of 3 in. by 1 in. battens. The length of the battens will greatly depend on the depth of the creek. The gates should be attached to the cable or top wire, at different distances, by two strands of No. 8 wire.

GRASS-SEEDING SANDY LOAM.

"SANDY LOAM," Paraparaumu :—

Would you kindly inform me which would be the best permanent pasture to sow for sandy loam, and manure to apply, for grazing either cow or horse? The paddock is at present down in oats and tares, being fed off.

The Fields Division :—

The following mixture per acre should give good results on the soil mentioned: *Danthonia semiannularis*, 3 lb.; *Danthonia pilosa*, 2 lb.; crested dogstail, 3 lb.; cocksfoot, 6 lb.; tall oat-grass, 4 lb.; Chewing's fescue, 2 lb.; prairie-grass, 5 lb.; *Lotus corniculatus*, ½ lb.; white clover, 1½ lb.; alsike, 1½ lb.; yellow trefoil, ½ lb.; sheep's burnet, 5 lb.: total, 34 lb.

The following mixture per acre of manures would be suited for the soil and grass-mixture conditions: 1 cwt. basic superphosphate, 1 cwt. Malden Island guano, 1 cwt. blood and bone, ½ cwt. muriate of potash.

COMMERCIAL INTELLIGENCE.

PORT OF LONDON.

THE High Commissioner for New Zealand transmits the following information regarding the progress of the works at the Royal Albert Dock, in which the Dominion is specially interested in relation to the frozen-meat trade :—

As regards the meat business, it will be recalled that the Port Authority decided some time ago to provide extensive additions to the existing stores at the western end of the dock. For this purpose they decided to demolish three single-story sheds, known as Nos. 29, 31, and 33, and to erect in their place a two-story shed of a total length of 1,100 ft. and a width of 120 ft., the upper portion to be insulated and used for the sorting of meat, and the lower portion for general cargo. In addition to this important work the Authority decided to erect a cold store at the back of the sorting-shed, 300 ft. in length, 100 ft. in width, and five floors in height, to provide sufficient space for the storage of 250,000 carcases of sheep.

To have to suddenly divert so much shed-space from the ordinary dock business to the meat business would have brought about a somewhat serious dislocation of the arrangements at the Royal Albert Dock, and it was found necessary to do the work in stages. The structure of the first portion of the sorting-shed, which has a floor-space of about 50,000 square feet, is practically finished, and the insulation is being proceeded with. Good progress has been made with the store at the back of the sorting-shed, the building having been carried up to the roof.

The general equipment of the Royal Albert Dock has also received attention, and the Board have ordered forty-three new electric cranes of greater height and radius and with double the lifting-capacity of the old hydraulic cranes.

As regards the new dock that is being constructed to the south of the existing Royal Albert Dock, considerable progress has been made with the work, and the concrete walls are being put in.

THE WORLD'S WHEAT-SUPPLY.

AT its two meetings held in March the Permanent Committee of the International Institute of Agriculture at Rome devoted most of its attention to the preparation of a pamphlet giving a summary of the official information, furnished by the different Governments which have formed the Institute, regarding the yield, import, export, and prices of wheat and other cereals. This the committee resolved to publish in the hope that it might, by furnishing trustworthy statistics, tend to allay panic and discourage speculation, and thus benefit the poorer classes and consumers throughout the world, including the smaller agriculturists. The necessary work of tabulation was undertaken by the staff of the Institute under the supervision of a sub-committee of five members, and the resulting pamphlet was circulated with the Institute's bulletin for March.

As regards wheat, the statistics showed that for the countries which sent returns to the Institute the official estimates of the wheat harvest for the cereal year ending February, 1915, including that reaped in the Southern Hemisphere in December and January last, amounted to 460 million quarters, as compared with the yield for the same countries in the previous year of 500 million quarters, and an average for the previous five years of 457 million quarters. Thus, although the yield of 1914–15 was equivalent to only 92 per cent. of the yield of the previous year, it exceeded the average yield of the previous five years, and was equal to 107 per cent. of the average yield of the previous ten years. Although smaller than the yield of the years 1912 and 1913, it was larger than that of any year previous to 1912.

Official estimates have been received from several countries of the area sown with winter wheat for the coming harvest, according to which it seems that a considerably larger area has been sown than in the previous year; but the only definite information as to the probable outturn is that furnished by India, according to which the wheat harvest now being reaped there is estimated to amount to about 49 million quarters, as compared with 39 million last year and with the average yield of 43·5 million quarters for the previous five years.

In another table figures are given showing for each country, on the average of the last five years, its production, import, and export of wheat, the average quantity available for consumption, the yield of wheat during the past year, and the quantity which each country would find it necessary to import or would have available for export, on the supposition that its requirements during the current year up till next harvest would be the same as they had been on the average of the last five years. These statistics are not complete, as there are a considerable number of countries, especially in the tropics, which import wheat and wheat-flour for their consumption but do not furnish returns to the Institute. So far as they go, they show that the countries which do furnish statistics would, on the above supposition, have required during the current commercial year ending 31st July next to import 74 million quarters, while the countries which ordinarily export wheat would, had there been no war, have had 91 million quarters available for export.—*From report by Sir J. Wilson, K.C.S.I., Delegate for New Zealand to International Institute of Agriculture, Rome, dated 12th April, 1915.*

FRUITGROWING IN ARGENTINA.

SOUTH AMERICA is at present taking practically all the fruit which New Zealand has available for export. In a very few years it will be necessary to arrange for extensive shipments to other countries. Meantime any information relating to the prospects of future trade with South America will be useful, and the following extract from a report by Mr. Consul-General Mackie on the "Wine and Fruit Industries of Argentina" will be read with interest.—*T. W. K.*

Fruit Industry.—Apart from the extensive cultivation of vines, it is safe to say that the fruitgrowing industry has scarcely emerged from its experimental stage of development. It is paradoxical that a country like Argentina, with a climate so adapted to fruitgrowing and hundreds of thousands of acres of land suitable for orchards, should import a product that could reasonably be expected to figure in the export lists of this Republic. To meet the local consumption it was necessary last year to import over 180,000 cases of apples, 80,000 cases of oranges and lemons, 70,000 cases of pears, and an equally large quantity of peaches, cherries, &c.

At present there appear to be about 150,000 acres of land under orchards in the whole of the Republic, with a total of 15,000,000 trees, chiefly consisting of peaches, oranges, apples, and pears. Since it became known that a powerful syndicate was in contemplation in London for the purpose of acquiring large tracts of land for fruit-cultivation on a scale not hitherto attempted, orchard-owners began to bestir themselves. The Press took the matter up energetically, and depicted in highly coloured terms what they considered a danger of the industry falling into the hands of foreigners. The larger fruitgrowers at once took steps to protect their interests against foreign encroachments, and formed a co-operative society much on the same lines as those existing in California, Italy, and Spain. The fruit industry, at one time practically confined to the islands of the Parana and one or two districts in the south, soon began to spread over the country, and one company alone is credited with having planted 200,000 peach-trees during the current year.

In order to encourage the grower on a small scale, the Government has created special markets for the sale of the produce direct to the consumer, and thus do away with the exorbitant profits of the middleman. A proposal to establish Government farms under the superintendence of European experts has been recommended from time to time, but the scheme never materialized. The agricultural schools have received instructions to experiment in apple-growing, both for table use and the manufacture of cider, a beverage little known in this country

and never as yet manufactured locally. A great deal of interest is being taken in the matter by capitalists in this country—so much so, in fact, that it is believed next year will see the fruit trade established on a wider scale and firmer basis.

From the pamphlets that have been written it would appear that fruitgrowing might be conducted successfully in practically any part of the Republic. At present the Province of Buenos Ayres occupies the first place both in regard to area under cultivation and the output of fruit-products. The opinion is expressed that many, if not all, the varieties of European fruit would thrive on the rich lands of the deltas and low banks of the rivers of that province, where peach and pear trees are said to cover some 75,000 acres of land. Apples grow best in the southern provinces of Rio Negro and Neuquen, and claim to acquire a flavour second only to that of the Tasmanian fruit. The development of that province by the extensive irrigation-works undertaken by the Great Southern Railway will doubtless give a great impetus to fruitgrowing in the near future. The productiveness of the region is already borne out by the luxuriant crops that are now being raised there. An idea of the magnitude of the undertaking may be gleaned from the fact that these irrigation-works promise to outrival those of the Nile itself. The great natural reservoir known as the Lago Pellegrini, that covers 62,500 acres, is being utilized for the storage of water. Its estimated capacity is not less than 183,450,000 cubic feet of water, while that of the Assuan Reservoir before the raising of the dam was but 35,280,000 cubic feet. The Province of Mendoza produces table-fruit of all kinds, grapes easily taking the first place.

Practically all the tropical species of fruit should thrive in the northern provinces of the Republic, especially in Salta and Jujuy. These provinces already produce the famous chirimoyo, a species of custard-apple held to be a great luxury in this country among the Natives. This fruit has even been exported with success, but no attempt has seemingly been made to grow it on a more extensive scale. The Province of Tucuman is also gradually becoming famous for its oranges, tangerines, and alligator-pears.

Detrimental Factors.—Disregard of the most elementary methods of planting, pruning, and grafting, neglect to employ manure and proper stimulants, complete disregard of the Government regulations enjoining the adoption of proper measures against the spread of disease and parasites, are said to threaten the very existence of even the largest orchards in Argentina. The result is the total output of fruit is not a third of what it should be. A cultivator with a certain amount of capital and possessing a knowledge of fruitgrowing should be in a position to secure a profitable return.

Scope for Expansion.—The railway system of Argentina is expanding every year and opening up fresh areas to fruitgrowing. This year (1913) the railway companies have inaugurated excellent services of special trains fitted with refrigerating plant. Refrigerated fruit, however, like all other frozen produce, deteriorates very quickly if allowed to thaw. As there are no cold chambers at the market-places, the fruit has to be rapidly disposed of. The large quantities of fruit remaining on hand are wasted before they reach the consumer. For fruit that can be placed on the market within twenty-four hours the ordinary method of conveyance is the more practicable, but an enterprising fruitgrower, taking advantages of the facilities for carrying fruit in refrigerated chambers both on the railways and the steamers, sent a trial consignment of grapes and peaches to New York. Although only 11 tons were shipped, the experiment proved successful, and the fruit found a ready sale in the winter season of the Northern Hemisphere. As the possibilities of fruitgrowing in this country are practically unlimited, there can be no doubt that sooner or later the supply will considerably exceed the demand. The great advantage offered by the fact that the fruit seasons of Argentina fall conversely with those of Europe and the United States, the creation of central depots for the collection of fruit, its proper grading, packing, &c., coupled with the existing system of cold storage, are all problems worthy of careful study with a view to the approaching development of the fruit industry.

Apples.—Apples thrive over an extensive area in Argentina, notably in the southern Pampean and Austral regions, and can also be found in sheltered places as far south as the shores of Magellan and Tierra del Fuego. Large tracts of land are available for the cultivation of the apple in districts where the grape does not thrive.

A fifteen-year-old tree is said to yield 240 apples, which should realize 8s. per tree, or £80 per hectare (= nearly 2½ acres) of 200 trees. Older trees, of course, would yield more. The best varieties are the Calvil, Red and White Calvil, Canadian

Pippin, King Pippin, Yellow Bellefleur, Great Alexander, Royal England, Peasgood, Nonpareil, Croncel Transparent, and St. Sauveur.

Pears.—The best varieties of pears cultivated in this country are the William, Duchess, White, Dean, Mellow Amanlis, Mellow Diel, Curate, and Triumph of Jodoigne. The two former grow best, although short-lived when grafted on the quince-tree. The Curate grows best when so grafted, and bears well. Good winter pears are lacking.

The yield is valued at £100 to £200 per hectare. Propagating from seed has produced the hardiest trees, and fruitgrowers are beginning to plant all the most productive varieties grafted on pear-stems grown from pips.

Quince.—The quince-tree grows well in the Northern Pampean, Southern Pampean, and Austral regions, and also along the banks of the Rivers Plate, Parana, and Uruguay. Its fruit is much prized for preserves, jellies, &c., and the tree is also valuable for grafting purposes with the pear-tree. There are a number of quince orchards in this country, where the yield is valued at £50 per hectare.

Other Varieties.—Among the other species of fruit not specially mentioned, but which thrive well in the several districts in which they are grown, are the almond, walnut, chestnut, hazel-nut, persimmon, Japanese and European medlars, guava, Brazilian guava, mulberry, olive, alligator-pear, pomegranate, currant, and raspberry.

NOTE BY THE SECRETARY OF AGRICULTURE, INDUSTRIES, AND COMMERCE.

Since the Consul-General's report was in print a long and valuable document dealing with the same matter has reached me from Mr. G. L. Tacon, who was deputed by the Right Hon. Mr. Massey, Minister of Agriculture, to visit South America to obtain information in the interests of New Zealand fruitgrowers. Mr. Tacon's report will be published by the Department as a free bulletin as soon as it can be got through the Printing Office. Persons interested are advised to await, before forming their opinions, what Mr. Tacon has written on the subject.—*F. S. P.*

SALE OF NEW ZEALAND FRUIT AT SAN FRANCISCO.

FOLLOWING are the average gross prices per case realized on the San Francisco market for a consignment of sixty-three cases of apples and pears, shipped on the 1st April last per s.s. "Marama," for competition at the Panama Pacific International Exposition :—

	Average Price per Case.
Apples.	
Jonathan	$1·94 (8s. 1d.)
Rome Beauty	$1·87 (7s. 9d.)
Monroe's Favourite	$1·69 (7s. 0d.)
Delicious	$1·55 (6s. 5d.)
Cox's Orange Pippin	
Pears.	
Winter Nelis	$3·75 (15s. 7d.)
Winter Cole	$3·50 (14s. 7d.)
Beurre Clairgeau	$3·00 (12s. 6d.)
Beurre Bosc	$3·00 (12s. 6d.)
Josephine	$2·78 (11s. 7d.)
Vicar of Winkfield	$2·55 (10s. 7d.)
Beurre Diel	$2·00 (8s. 4d.)
Lucy Grieve	$1·40 (5s. 10d.)
Vermont Beauty	

The apples landed in good order, excepting the only case of Cox's Orange Pippin, which turned out bruised and unfit for sale. Of the pears, one case of Winter Cole, one of Beurre Clairgeau, and the only two of Vermont Beauty were rotten and had to be destroyed. The fruit came from the Otago, Nelson, and Hawke's Bay Districts. Owing to the small quantities sent, the fruit could not be carried under the best conditions. The Union Steamship Company, however, very kindly allowed it to go in the ship's vegetable-store.

COMMERCIAL ORCHARDS.

ESTIMATES received from Instructors of the Orchards, Gardens, and Apiaries Division show that 2,625 acres will be planted in commercial orchards throughout the Dominion during the current planting season (1915). The districts in which the largest areas will be planted are as follows: Auckland, 700 acres; Nelson, 550 acres; Otago, 450 acres; Marlborough, 200 acres; North Canterbury, 200 acres; Hawke's Bay, 150 acres.

SHEEP IN THE DOMINION.

THE Interim Return of Sheep in the Dominion as at the 30th April, 1915, shows a total of 24,465,526 head. Compared with the complete returns for the previous year, this is a decrease of 333,237, made up by shrinkages of 169,591 in the North Island and 163,646 in the South Island. The figures of the interim return are approximate only; the complete returns for 1915 will be published in due course.

NEW ZEALAND APPLES IN LONDON.

IN March last the Department forwarded a small trial consignment of fruit to London in order to test the market on various points. The consignment included four cases of apples, as follows: One case containing three trays Cox's Orange, one case containing three trays Jonathan, one case Monroe's Favourite and Jonathan packed in the ordinary manner in tiers, and one case Adams's Pearmain, Cox's Orange, and Jonathan, also packed in tiers. The apples were sold at Covent Garden Market after due display and publicity had been given to them. The case of Cox's Orange fetched the extreme price of 10s. per tray, an average of over 3¾d. per apple. The case of Jonathans realized 5s. per tray, or over 1¾d. per apple. The other two cases, containing mixed varieties packed in the ordinary manner, brought 14s. per case. The selling brokers expressed the opinion that if Cox's Orange apples could be packed in trays and landed in similar condition to those sold there would always be a special price obtainable for them, and that probably a price nearly, if not quite, as high as 10s. per tray could be obtained from special purchasers.

STOCK SLAUGHTERED.

THE following is a return of stock slaughtered at abattoirs, meat-export slaughterhouses, bacon-factories, and ordinary slaughterhouses during the year ending 31st March, 1915:—

—	Abattoirs.	Meat-export Slaughterhouses.	Bacon-factories.	Ordinary Slaughterhouses.	Totals.
Cattle ..	101,097	182,120	..	64,136	347,353
Calves ..	10,831	10,255	..	1,469	22,555
Sheep ..	608,892	3,085,351	..	300,217	3,994,460
Lambs ..	79,730	4,356,151	..	35,980	4,471,861
Swine ..	46,468	22,024	82,000	46,821	197,313

In addition to the above, 44,370 pigs killed and dressed by farmers were inspected at butchers' shops.

AGRICULTURAL STATISTICS.

ACTUAL YIELDS OF FIELD CROPS.

THE following table, compiled by the Government Statistician from returns collected through the post, gives the average actual yields of field crops for the season 1914–15 :—

Provincial District.	Bushels per Acre.					Pounds per Acre.				Tons per Acre.		
	Wheat.	Oats.	Barley.	Maize.	Peas.	Rye-grass.	Cocksfoot.	Red Clover.	White Clover.	Potatoes.	Turnips.	Mangels.
Auckland	23·14	31·32	43·27	52·84	14·97	214·62	222·23	..	89·21	6·29	15·96	22·38
Taranaki	35·14	39·91	39·95	..	57·22	536·12	133·40	..	..	6·92	19·96	26·08
Hawke's Bay	16·29	22·82	29·50	32·52	22·54	276·90	129·24	..	119·00	9·33	12·53	29·78
Wellington	32·61	36·76	35·11	..	49·34	300·82	180·33	216·40	83·33	8·76	13·49	29·13
Marlborough	21·14	26·27	18·24	..	13·59	528·34	208·49	176·18	76·40	4·55	9·15	13·80
Nelson	30·20	20·71	29·72	..	26·78	111·76	87·27	197·81	176·92	5·07	8·99	19·08
Canterbury	29·61	36·99	40·63	..	34·94	345·72	125·81	130·57	159·09	5·63	8·65	23·34
Otago—												
Otago portion	25·83	37·29	37·50	..	32·57	447·12	161·06	200·00	..	5·68	11·78	18·85
Southland portion	32·91	47·44	40·54	..	..	485·96	143·30	..	..	5·97	10·43	28·00
Averages for the Dominion, 1914–15	28·94	39·77	32·53	50·26	26·76	420·64	135·50	140·69	153·43	6·06	11·75	23·69
Averages for the Dominion, 1913–14	31·37	40·75	37·65	51·79	31·64	392·89	191·11	163·10	138·30	5·39	13·03	29·99

THE DOMINION'S EXPORTS TO BRITAIN.

COMPILED FROM MANIFESTS OF VESSELS SAILED DURING RESPECTIVE MONTHS OF CURRENT AND PRECEDING SEASONS.

Month.		Mutton, Carcases.	Lamb, Carcases.	Beef, Quarters.	Pork, Carcases.	Butter, Boxes.	Cheese, Crates.	Wool, Bales.	Wheat, Sacks.	Oats, Sacks.	Rabbits, Crates.	Hemp, Bales.	Tow, Bales.	Kauri-gum, Cases.
January,	1915	137,816	296,439	45,622	339	138,081	85,123	87,393	..	..	2,860	683	..	1,209
,,	1914	231,766	464,185	30,424	33	150,492	136,086	108,742	..	500	2,851	15,234	4,306	11,133
February,	1915	433,585	517,581	77,421	311	119,371	96,090	159,347	..	..	..	13,111	6,619	2,763
,,	1914	354,190	334,207	14,100	3	86,570	59,532	127,372	..	4	..	3,709	633	7,607
March,	1915	80,439	203,480	30,176	..	55,280	51,811	49,809	..	..	..	8,410	185	274
,,	1914	446,522	551,313	36,689	..	61,060	62,732	95,175	..	..	..	8,187	2,562	3,958
April,	1915	286,155	328,779	45,340	..	6,703	38,561	41,371	..	..	1,011	9,328	1,474	3,461
,,	1914	234,765	366,786	22,185	..	7,822	63,796	58,488	..	2,901	..	1,247	888	5,909
May,	1915	257,953	433,831	34,780	655	148	17,065	21,615	..	..	2,923	4,968	808	2,636
,,	1914	336,632	638,397	39,315	54	837	37,776	43,364	3,623	11,062	..	8,355	2,112	9,316
June,	1915	99,080	154,785	19,316	932	..	26,869	11,946	..	..	9,800	5,027	1,320	1,229
,,	1914	261,877	634,981	36,400	..	1,153	19,247	18,774	..	28,141	1,000	7,924	4,258	7,881
July,	1914	225,411	239,143	38,170	..	1,355	2,003	15,868	..	1,425	1,000	5,810	2,584	8,053
,,	1913	215,713	331,353	14,030	..	..	1,687	17,169	5,651	300	9,190	9,682	1,720	10,793
August,	1914	4,251	63,111	19,094	516	1,979	50	4,845	600	38,220	10,403	367	245	3,705
,,	1913	161,593	178,263	13,129	6	8	407	8,494	11,604	45	38,480	3,714	2,310	6,406
September,	1914	3,386	49,200	2,353	..	15,885	..	3,337	..	5,896	7,288	1,143	57	..
,,	1913	133,122	83,521	5,334	16	6,575	2,020	7,176	..	..	16,336	3,826	1,501	10,049
October,	1914	291,432	128,016	49,104	..	81,842	30,487	8,938	..	68,660	38,121	2,042	1,650	1,683
,,	1913	14,122	25,735	580	..	42,847	21,452	2,705	..	..	10,020	6,986	3,672	2,923
November,	1914	136,346	27,577	48,302	27	98,729	70,048	37,604	15	24,289	35,783	885	110	1,377
,,	1913	20	1,479	..	..	53,468	23,722	1,891	..	..	2,478	4,162	771	2,314
December,	1914	192,952	149,835	44,876	..	172,990	80,114	86,317	..	..	9,306	1,136	116	2,157
	1913	128,087	86,890	8,909	..	249,526	124,821	51,385	..	250	24,479	19,807	5,276	11,273

LONDON MARKET VALUES.

COMPARATIVE STATEMENT COMPILED FROM THE HIGH COMMISSIONER'S CABLES FOR THE PAST THREE MONTHS.

London Date.	Wool. Bradford Quotations for Tops. 36's.	40's.	44's.	50's.	56's.	60's.	Mutton. Canterbury.	Mutton. North Island.	Lamb. Canterbury.	Lamb. Other than Canterbury.	Beef. New Zealand Hinds.	Beef. New Zealand Fores.	Butter. Danish.	Butter. New Zealand.	Cheese. New Zealand White.	Cheese. New Zealand Coloured.	Cheese. Canadian.	Hemp (Spot). New Zealand Good-fair.	Hemp (Spot). New Zealand Fair.	Hemp (Spot). Manila Fair Current.	Hemp (Forward Shipment). New Zealand Good-fair.	Hemp (Forward Shipment). New Zealand Fair.	Hemp (Forward Shipment). Manila Fair Current.	Wheat. Short-berried.	Wheat. Long-berried.	Oats. Sparrowbills.	Oats. Danish.
1915.							d.	d.	d.	d.	d.	d.															
April 1	..	..	..	..	..	..	..	6¼	..	8	6½	6	142/0	136/0	94/0	94/0	98/0	35/0/0	33/0/0	40/10/0	34/10/0	32/10/0	40/0/0	..	..	..	..
,, 10	..	..	..	..	..	..	..	6¼	8½	8	6⅜	6	142/0	136/0	94/0	93/0	98/0	34/10/0	32/10/0	40/0/0	34/0/0	32/0/0	39/10/0	..	..	..	..
,, 17	..	..	..	..	..	..	..	6	8¼	8	6½	6⅛	144/0	135/0	94/0	93/0	98/0	33/10/0	31/10/0	39/0/0	32/15/0	31/0/0	38/10/0	..	..	..	..
,, 24	..	..	..	..	..	..	6¼	6 1/16	8	7	6⅝	6⅛	144/0	134/0	94/0	93/0	98/0	32/10/0	30/10/0	38/0/0	31/10/0	29/10/0	36/10/0	..	..	..	..
May 1	..	..	..	..	..	..	6¼	6 1/16	7	..	6⅝	6¼	146/0	136/0	94/0	94/0	98/0	32/10/0	30/10/0	39/0/0	31/10/0	30/0/0	..	..	..	..	..
,, 8	..	..	..	..	..	..	6¼	6 1/16	7⅞	7	6⅝	6¼	154/0	140/0	94/0	94/0	98/0	33/0/0	31/0/0	39/10/0	32/10/0	30/10/0	..	..	..	..	..
,, 15	..	..	..	..	..	..	6¼	6 1/16	7 13/16	..	..	..	156/0	144/0	95/0	94/0	98/0	32/10/0	30/10/0	39/0/0	32/0/0	30/0/0	38/0/0	..	..	..	..
,, 22	..	..	..	..	..	..	6⅜	6⅝	8	7⅞	7¼	6½	156/0	146/0	94/0	94/0	98/0	33/0/0	31/0/0	39/10/0	32/10/0	30/10/0	39/0/0	..	..	..	..
,, 29	..	..	..	..	..	..	6¼	6⅝	8¼	8⅛	..	..	150/0	144/0	100/0	100/0	..	32/10/0	30/10/0	39/0/0	32/0/0	30/0/0	38/10/0	..	..	..	..
June 5	..	..	..	..	..	..	7	..	8¼	8¼	8	6¾	148/0	142/0	100/0	100/0	98/0	32/10/0	30/0/0	39/0/0	32/0/0	29/10/0	39/0/0	..	..	..	..
,, 12	2/1	2/2	2/3½	2/7½	2/9½	3/1	7	7	8⅜	8⅜	..	..	149/0	142/0	98/0	97/0	97/0	32/10/0	30/10/0	39/0/0	..	..	..	..	..	..	..
,, 19	..	..	..	..	..	..	7½	7½	8⅜	8⅜	8	7	149/0	142/0	94/0	93/0	94/0	32/10/0	30/10/0	38/10/0	31/15/0	29/10/0	38/0/0	..	..	..	..
,, 26	..	..	..	..	..	..	7¼	7⅛	8⅜	8⅜	..	..	152/0	144/0	96/0	94/0	93/0	32/10/0	30/10/0	38/10/0	31/15/0	29/10/0	38/0/0	..	..	..	..
July 3	..	..	..	..	..	..	7¼*	7⅛	8⅜	8⅜	..	..	154/0	146/0	94/0	93/0	90/0	32/0/0	30/0/0	38/10/0	31/10/0	29/10/0	36/10/0*	..	..	35/0	..

* New graded "Fair."

HEMP AND TOW GRADING RETURNS.

JUNE.

Hemp.—The total number of bales graded was 9,096, as compared with 5,904 for the corresponding month of last year, an increase of 3,192 bales. For the twelve months ending 30th June, 1915, the number of bales graded was 86,241, as compared with 134,876 for the previous twelve months, a decrease of 48,635 bales.

Tow.—During the month 2,547 bales were dealt with, as compared with 1,975 for the corresponding month of last year, an increase of 572 bales. For the twelve months ending 30th June, 1915, the number of bales graded was 23,188, as compared with 43,719 for the previous twelve months, a decrease of 20,531 bales.

Stripper-slips.—During the month the number of bales graded was 199, as compared with 23 for the corresponding month of last year, an increase of 176 bales. For the twelve months ending 30th June, 1915, the number of bales graded was 1,590.

HEMP, TOW, AND STRIPPER-SLIPS GRADED THROUGHOUT THE DOMINION DURING THE MONTH OF JUNE, 1915.

Hemp.

Port.	Superior.	Fine.	Good-fair.	Fair.		Common.	Rejected.	Condemned.	Total.
				High Point.	Low Point.				
	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.
Auckland ..	..	..	142	509	726	229	7	6	1,619
Foxton ..	..	..	852	1,416	233	93	46	8	2,648
Wellington ..	..	74	983	1,919	235	84	37	..	3,332
Blenheim ..	..	19	79	42	58	..	..	..	198
Picton ..	..	65	60	19	..	..	..	..	144
Bluff	..	..	96	246	243	..	..	..	585
Dunedin ..	..	1	70	84	..	..	..	..	155
Lyttelton ..	..	..	50	..	..	..	..	..	50
Napier ..	..	..	234	122	..	9	..	..	365
Totals ..	..	159	2,566	4,357	1,495	415	90	14	9,096
Percentages of totals	..	1·75	28·22	47·9	16·43	4·56	0·98	0·15	..

Tow.

Port.	First Grade.	Second Grade.	Third Grade.	Condemned.	Total.
	Bales.	Bales.	Bales.	Bales.	Bales.
Auckland ..	10	112	335	32	489
Foxton ..	144	325	72	2	543
Wellington ..	171	469	43	..	683
Napier	41	..	37	..	78
Blenheim ..	29	80	..	..	109
Picton	..	74	..	..	74
Bluff	36	43	222	13	314
Dunedin ..	..	11	32	..	43
Lyttelton ..	178	36	..	..	214
Totals ..	609	1,150	741	47	2,547

Stripper-slips.—Foxton: Second grade, 118. Wellington: First grade, 69; second grade, 12—total, 81.

NEW ZEALAND-SAN FRANCISCO TRADE.

FOLLOWING are the shipments of produce for San Francisco, Tahiti, and Rarotonga, and transhipments for Vancouver, from New Zealand, since February last:—

—	"Moana," 4th March.	"Marama," 1st April.	"Maitai," 30th April.	"Moana," 28th May.	"Marama," 24th June.
Gum, packages	31	13	49	16	98
Milk, cases	..	9	..	..	..
Grain, sacks	30	34	47	10	13
Meat cases	..	61	55	60	50
Onions, cases	..	36	17	14	23
Potatoes, sacks	..	42	32	16	26
Sundries, packages	4	17	498	41	114
Butter, boxes	7	9	2	5	5
Hemp, bales	..	..	..	259	261
Frozen lamb, carcases	3	..	3	3	5
Hides and skins, sacks and bales	..	..	..	..	..
Beef, quarters—pieces	7	8	..	..	..
Veal, carcases	200	..	..	..	..
Cheese, crates	..	9	..	..	..
Sheep-skins, bales	..	16		..	..

NEW ZEALAND-VANCOUVER TRADE.

FOLLOWING are the shipments of produce for Vancouver and North American ports from New Zealand since January last:—

—	"Makura," 22nd Feb.	"Niagara," 26th March.	"Makura," 20th April.	"Niagara," 18th May.	"Makura," 15th June.
Butter, boxes	8,175	9,030	4,875	..	..
Mutton, carcases	78	..	..	..	..
Lamb, ,,	175	..	..	..	..
Beef, quarters—pieces	221	..	..	..	..
Veal, carcases	23	..	..	..	..
Frozen sundries, packages	22	..	..	..	..
Wool, bales	210	1,198	531	431	264
Grass-seeds, beans, &c., sacks	..	..	261	..	..
Hides and skins, sacks, &c.	1,277	996	702	1,473	1,543
Onions, cases	1,333	2,000	200	..	..
Sheep-skins, bales	136	96	186	134	15
Jam, cases	..	..	..	..	..
Sundries, packages	..	22	36	17	..
Pelts, casks	83	40	30	..	..
Kauri-gum, packages	..	53	360	1,180	2,043
Hemp, bales	264	250	97	327	..
Rabbits, crates	..	..	..	..	..
Timber, pieces	..	..	..	..	..
Eggs, cases and crates	..	..	..	..	..
Meats (canned, &c.), cases	..	..	..	..	..
Cheese, crates	..	..	..	..	..
Fresh fruit, cases	..	985	1,610	..	..

STOCK EXPORTED.

THE following table shows the numbers and descriptions of stock exported from the Dominion during the month of June, 1915:—

Port of Shipment.	Horses.			Sheep.			Cattle.		Pigs.		Dogs.		
	To Australia.	To Eastern Pacific.	To Montevideo.	To Australia.	To Eastern Pacific.	To South America.	To Australia.	To Eastern Pacific.	To Australia.	To Eastern Pacific.	To Australia.	To Eastern Pacific.	To United Kingdom.
Auckland ..	1	..	..	..	267	..	..	25	..	39	..	..	..
Gisborne ..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wellington ..	..	..	..	78	..	..	..	..	..	..	..	..	..
Lyttelton ..	..	..	..	834	..	..	..	..	..	..	..	..	..
Timaru ..	..	..	..	850	..	..	..	..	..	..	..	..	..
Dunedin ..	30	..	..	28	..	..	..	..	..	..	..	..	..
Bluff ..	1	..	..	..	..	..	..	..	..	..	..	..	..
Totals ..	32	..	..	1,790	267	..	..	25	..	39	..	..	..

Particulars of horses shipped: Draughts, 19 mares, 10 colts; 1 thoroughbred gelding; 1 light horse; 1 trotting stallion.

Auckland also exported 8 crates of poultry.

STOCK IN QUARANTINE.

THE following stock was received into quarantine during the month of June, 1915:—

No.	Description.	Sex.	Port of Origin.	Owner or Agent.	Address.
			MOTUIHI ISLAND (AUCKLAND).		
1	Gordon setter ..	Female	Sydney ..	Miss E. M. Clark ..	Auckland.
			SOMES ISLAND (WELLINGTON).		
1	Pomeranian ..	Male ..	London ..	S. Johnson ..	Palmerston North.
2	Pomeranians ..	Male and female	,, ..	H. Compton ..	Wellington.
3	Pekingese ..	Male ..	,, ..	,, ..	,,
1	Sheep-dog ..	Female	,, ..	R. Dixon ..	Wanganui.
7	Pups ..	Mixed	,, ..	,, ..	,,
			QUAIL ISLAND (LYTTELTON).		
			Nil.		